Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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— and 35 others

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FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
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4	Oils	9	Miscellaneous

2.115 STABILIZER TO REDUCE ROLLING

Anonymous
Norwegian Fishing News I, No. 2, 18 (1954)

Devices designed to reduce rolling in ships include gyros, rolling tanks, and stabilizers. The disadvantages of these types of equipment are as follows: (1) they are expensive; (2) they require care; and (3) they occupy usable space. For these reasons, most ships are equipped with a common rolling keel, which consists of a flat bulb or similar arrangement welded to the plating or attached to the ship side through angles.

The common rolling keel, placed in the bilge, can reduce rolling to but a limited degree, as the water, during rolling, is only partly held up. A device to brake the rolling to even a greater extent is the patented external stabilizer NOR, which is welded to the hull with a flange. Braking is considerably increased by the double action of pressure on one side of the stabilizer and vacuum on the other side.

It was expected that the increased friction added by the stabilizer would cause a slight reduction in speed, but on the contrary, experience has shown better course in heavy seas. Fishing vessels obtain larger catches due to smoother running, and fishing gear is exposed to less wear. No damage due to interference with line or nets has been encountered nor has damage due to ice or other cause been experienced -- even in operations in Greenland waters.

The welding of the stabilizer to the hull of a ship is easily accomplished. In fact, the process has been completed in 10 hours while a ship was up for bottom cleaning.

(over)

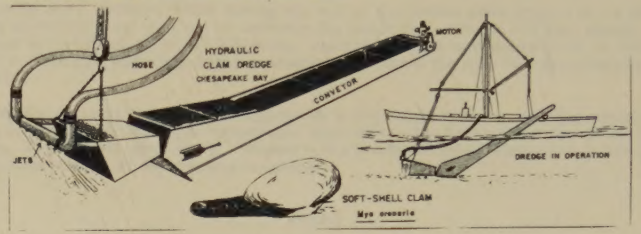
 ABSTRACTER: Kathryn L. Osterhaug

2.1128 SOFT-SHELL CLAM DREDGE ALLOWS SUSTAINED PRODUCTION

Anonymous
Commercial Fisheries Review 17, No. 2, 28-29 (February 1955)

Conservation officials, including representatives of the U. S. Fish and Wildlife Service, Dominion of Canada and the states of Maine and Massachusetts, after observing a hydraulic dredge used in catching soft-shell clams in Maryland, agreed that it is an effective gear. They also agreed that it is a considerable improvement conservation-wise, over other methods of harvesting clams.

In clamming areas where hand-digging methods are employed, many clams of market size are broken, and there is a high mortality in the undersize clams. This represents a serious loss to the industry. In contrast, an experienced and careful hydraulic dredge operator breaks only about five percent and most of the clams missed by the dredge are able to rebury themselves. Exposed clams are vulnerable to predators, such as crabs and eels.



 ABSTRACTER: Kathryn L. Osterhaug

2.1121 WESTERN JIB TRAWL

Anonymous
National Fisherman 36, No. 1, 13-14 (February 1955)

A new-type, flat shrimp trawl known as the "Western Jib" has been developed at Freeport, Texas. Eight large shrimp boats have now tested the net, and all have adopted it in dragging off the Texas coast.

The advantages found for the Western Jib are that it gets more spread, pulls easier, does not swing open with a load in the bag, and does not tear easily. The key to the design is in the jibs -- the forward topside pieces -- which are hung so that, in use, the strain is with the webbing, and the jibs do not pull out of shape.

Formula for making net. -- The Western Jib is a formula-built net. Any size can be constructed from the following directions: For a 100-foot trawl using 2 1/4-inch stretched-mesh webbing, 25 percent of the float line will be free of jibs. Twelve inches times 100 feet gives 1,200 inches, float-line length. Twenty-five percent of 1,200 inches is 300 inches.

The middle of the trawl will be hung 3 meshes on 5 inches. Three hundred divided by 5 gives 60 hangings. Sixty times 3 gives 180 meshes in the middle body of the trawl.

There are 900 inches left for the jibs. All jib hangings will be 1/2-inch less than 2 meshes stretch. So the jibs are hung 2 meshes on 4 1/4-inches. Nine hundred divided by 4 1/4 gives 212 hangings or 106 hangings for each jib.

(over)

 ABSTRACTER: F. Bruce Sanford

2.01 KEEPING QUALITY OF CHILLED DUNGENESS CRAB MEAT IN HERMETICALLY-SEALED METAL CONTAINERS

Carle, Louise A. and Kyte, Lydiane (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 17, No. 2, 12-14 (February 1955)

Investigations on the keeping quality of chilled Dungeness crabmeat are being carried out to provide helpful data for the preparation of recommendations to industry and for the establishment of government purchase specifications.

Since there are no commonly accepted objective standards of acceptability for evaluating the keeping quality of crabmeat, it is necessary to rely on organoleptic examinations. In the tests reported here, odor and appearance were used to evaluate quality. The odor of fresh Dungeness crabmeat changes from a sweet crab odor to almost no odor and then to a strong crab odor which is still just acceptable. In the next steps the crab becomes tainted, unpleasant, and repugnant. The appearance changes from the moist, white, eye-appealing fresh meat to yellowish gray, as adverse changes occur.

A short study on the effect of brining on the bacterial load of crabmeat was made. Bacterial counts show that the load was reduced considerably after brining.

Table 2-Effect of Brining on Bacterial Load of Crab Meat

Time of Collection	Bacteria in Leg Meat		Bacteria in Body Meat	
	Before Brining	After Brining	Before Brining	After Brining
	Bacteria/gram	Bacteria/gram	Bacteria/gram	Bacteria/gram
8:00 A. M.	238,000	111,000	123,000	193,000
1:00 A. M.	1,070,000	266,000	4,180,000	170,000
4:00 P. M.	570,000	250,000	2,190,000	360,000

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 ABSTRACTER: Kathryn L. Osterhaug

STABILIZER TO REDUCE ROLLING

WESTERN JIB TRAWL

HYDRAULIC CLAM DREDGE

KEEPING FRESH CRABMEAT

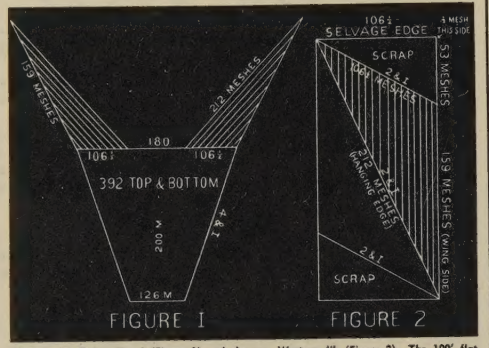
2.1121

Two meshes per hanging gives a jib 212 meshes long on the hanging side and 106 meshes on the body side. One hundred and eighty meshes on the middle body plus 106 under each jib totals a body of 392 meshes. The top and bottom will be 392 meshes each.

The wings will be 20 percent of the body. Twenty percent of 392 is 78 meshes, and the wings will come out straight.

Features. -- With straight wings, the trawl will not tear in two if it bogs down with mud or shell. Furthermore, the strain comes with the webbing so the jibs will not pull out of shape. Also the Western Jib has 106 meshes on the body side of the jib and 106 hangings on the line side of the jib -- one hanging for each mesh on the body. Therein lies the strength that keeps the selvage from ripping and allows the trawl to be pulled out of serious boggings.

Experiments have shown that the Western Jib, in a 95- to 98-foot model, will pull easier than the old style 90-foot flat nets and will give more spread. It is reported that some of the fishermen who have tried the net thought they had torn up as the trawl hit bottom because of the unusually wide spread.



Western Jib Shrimp Trawl (Figure 1) and the new Western Jib (Figure 2). The 100' flat trawl with 2¼" stretched mesh webbing is hung on ½" manila covered cable. The 8' legs use ¼" drop chain all the way across sweep line, and drops are 8 links—3/16" chain. The bottom setback is 28 meshes, and the 90 mesh extension is tapered to 42 meshes, giving a 240 mesh throat to go on 160 mesh bag. The jib has 159 meshes on the wing side; its 106 mesh body side and 212 mesh hanging edge are of 1 point—2 bar construction.

2.01 (Cross Reference: 1.86)

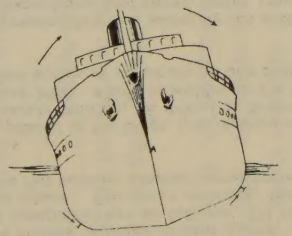
Table 1 - Comparison of Storage Life and Bacterial Count of Chilled Dungeness Crab Meat Held at 40° F.

Series	Type of Pack 1/	Initial Bacterial Plate Count 2/	Acceptable Storage Life at 40° F.	Bacterial Plate Count on Minimum 3/ Acceptability Date
		Bacteria/gm	Days	Bacteria/gm
1A	No vacuum. Held at 40° F. during approximately 20-day examination period.	1.7×10^5	5	1.4×10^7
1B	High vacuum (20 in.). Held at 40° F. during approximately 20-day examination period.	1.7×10^5	7	6.4×10^7
2	Medium vacuum (10 in.). Held at 40° F. during approximately 20-day examination period.	0.92×10^5	9	19×10^7
3	Medium vacuum (10 in.). Frozen storage for 5 weeks then held at 40° F. for approximately 20-day examination period.	8.7×10^5	7	5.0×10^7 (estimated)
4	No vacuum. Frozen storage for 5 weeks then held at 40° F. for approximately 20-day examination period.	180×10^5	2	1.5×10^7

1/ All samples were packed in double-seamed 6½ oz. C-enamel cans.
2/ Total bacteria count determined by method of Elliot, R. P., Commercial Fisheries Review, vol. 10, no. 11, November 1948, pp. 11-25.
3/ Date on which meat was still organoleptically acceptable prior to date on which meat became unacceptable.

2.115

Care should be taken that the welded flange has a safe clearance to the dock, and the flanges should be rounded in both the fore- and after-ends. They are installed at approximately right angles to the mid-line of the ship and may have additional structures where the ship sharpens fore and aft.



2.1128 (Cross Reference: 1.82)

2.01 EFFECT OF ADDITION OF AUREOMYCIN TO SEA WATER ON THE VIABLE BACTERIA PRESENT IN THE VISCERA OF LIVING FISH

Boyd, J. W.; Bissett, H. M.; and Tarr, H. L. A. (Pacific Fisheries Experiment Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 102, 4-5 (March 1955)

The effectiveness of aureomycin in retarding post mortem bacterial spoilage of fish has been emphasized in previous reports in the present series. It was therefore of interest to determine whether the antibiotic would decrease or eliminate the bacteria present in the visceral organs of living fish.

Procedure. -- Owing to limited facilities, only a few tests were made. Tanks that have been installed on a fishing boat for transporting fish in refrigerated sea water were employed. The fish used were "rock bass" (Sebastodes). They were kept alive in slatted boxes suspended alongside the boat prior to commencing the tests. Only a few fish were available for each test, and where possible, a like number were kept in sea water alone as well as in sea water containing added aureomycin. Either 1 or 5 p. p. m. of aureomycin was added to the sea water, which was aerated by means of an air pump and "spargers."

The fish were treated for 24 hours, promptly transported to the laboratory, and there eviscerated aseptically. The viscera of the fish were pooled, blended with 3 parts sterile water, and the numbers of viable bacteria and the aureomycin content were determined.

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 ABSTRACTER: F. Bruce Sanford

2.14 USE OF AN ELECTRICAL ATTRACTING AND GUIDING DEVICE IN EXPERIMENTS WITH A "FISH PUMP"

Smith, Keith A. (U. S. Fish and Wildlife Service)
Commercial Fisheries Review 17, No. 2, 1-7 (February 1955)

A system for attracting and guiding fish into the intake hose of a "fish pump" was tested on Puget Sound by the John N. Cobb in October and November 1954. Great numbers of small fish (mainly herring) were lured by the device and pumped into a live-holding tank on deck.

The bladeless-impeller pump, powered by a 5-h. p. electric motor pumped 220 gallons of water per minute. The end of the intake hose with carbon plate anode attached, an underwater light, and stainless-steel wire-screen cathode were all fixed on a wooden framework (see figure, over). The whole assembly was suspended over the side of the vessel by a single cable from the boom.

Best results were obtained while having the end of the intake hose from 5 to 15 feet below the surface. An electrical field was set up between the anode and cathode (10 feet apart). The amount of current was varied from 85 to 170 amperes, and the current was pulsed 6 to 13 times per second. A 1,000 watt underwater light was found necessary to attract the fish into the effective area of the electrical field.

Power for the electrical field was supplied by a 600-ampere d. c. welding machine. The machine was of a combination motor-generator type driven by power from one of the Cobb's 220-volt, 3-phase, 30 kilowatt generators. Pulses were produced by an electronic pulse generator connected to the field circuit of the welding machine.

(over)

 ABSTRACTER: M. R. Greenwood

2.9 MAN CAN LIVE ENTIRELY ON FISH

McLeod, R. A. (Pacific Fisheries Experimental Station)
Western Fisheries 49, No. 6, 24-25, 79 (March 1955)

Of the 250 species of fish in B. C. waters, some of the more popular are being fully utilized, but could be further appreciated. Other less important species could be more useful if their significance as a complete source of the food requirements -- protein, energy, fat, vitamins, and minerals -- were known.

The most important contribution fish makes to the diet is readily digestible protein. The quality of protein found in fish is equal to that found in mammals although there is less connective tissue in fish. Experiments have shown that red cell count and hemoglobin levels are as well maintained on seafoods as on meat diets.

Fat contributes to the flavor of foods and is an excellent source of energy, but it is not essential to the diet. The fats of fish are 95 percent digestible and easily absorbed. That man can absorb large amounts of marine fats is evident from the diet of the Eskimos. The daily intake of fat from all food sources by people in a moderate climate is about 75 grams, or one-half that of the amount consumed by the Eskimos. The fat of fish varies from one species to another and also in the same species in different seasons. The range of fat content is from one percent in lingcod to 15 percent in salmon.

Although fish contains relatively little carbohydrate, ribose can be utilized by the body.

The vitamin requirements of man could be satisfied on a diet of marine vertebrates and invertebrates. Unfortunately, the visceral organs of fish are the most important source of these nutriments.

(over)

 ABSTRACTER: Lois Elgin

2.14 CONDITIONS FOR TROLL FISHING

Tully, John P. (Pacific Biological Station, Nanaimo, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 12-16 (December 1954)

The belief exists that fish seek the conditions that are most favorable to them. If it were known what these conditions are and when and where they occur, it would be possible for fishermen to locate and catch fish with less effort. An obvious approach to this problem would be to ask fishermen when and where they made their good catches and their poor catches and then to determine if these catches are related in any way to the conditions of the fishing area.

When data showing the average catch of salmon per man-hour of trolling along the Pacific Coast were examined, the best spring-salmon fishing was about one fish per hour in May and June and the best coho-salmon fishing was about three fish per hour in August.

The annual catch of spring and coho salmon and the hours of fishing, taken at random from the records of 6 fishermen, showed a catch of 2.6 to 3.7 fish per hour. This catch is a measure of the fisherman's effort, of his individual skill, and of the productiveness of the area that he fishes. The difference in effort was found to be more important than the difference in skill because the largest seasonal catches were made by the men who worked the longest.

After studying catch data classified according to the temperature at the surface of the water and at the depth of fishing, the author concluded that temperature within the summer range (45 - 55° F.) is not a controlling factor.

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 ABSTRACTER: Martin Heerdt

AUREOMYCIN VS. LIVE-FISH BACTERIA

NUTRITIVE VALUE OF SEAFOOD

ELECTRONIC GUIDING OF FISH

CONDITIONS FOR TROLL FISHING

2.9

Until recently, when new methods of producing vitamins were perfected, the vitamins A and D found in liver oils were very important. Some liver oils are still used in animal feeds. Generally the flesh of fish is not a good source of these vitamins, although vitamin D is found in some of the more oily species of fish.

The B group of vitamins is also found in the visceral section. Some vitamins of this group are destroyed by cooking, but adequate amounts of nicotinic acid are found.

Minerals found in the bones of fish are calcium, phosphorus, and iron. Fish are unusually good sources of iodine, copper, and flourine.

Diets requiring low sodium often utilize seafood products. Salt-water fish have been found to contain less sodium in some cases than beef, lamb, or pork.

If vitamin C was supplemented and the visceral section of the fish also consumed, one could live indefinitely on fish. Vitamin C is found in oysters, seaweed, and in the milts and roes of fish.

2.14 (Cross Reference: 9.11)

Moon-phase and tide-range data were also studied. If the fishery were related to either of these phenomena, either a biweekly or a monthly cycle of catch would occur. The data, however, did not show any cycles.

Wind velocity and wind direction was also studied for its effect on the catch. The coho-salmon catch during southeast winds of less than 12 m.p.h. and the spring-salmon catch during southeast winds of more than 12 m.p.h. at Kyuquot were significantly greater than average. These findings probably indicate a local or seasonal condition, however, since similar findings are not evident in the data from other areas.

It may thus be said that the limited available data indicate that there is no general relationship between the catch and the water temperature, the tide stage, or the wind velocity. This conclusion is in agreement with the opinion of the fishermen that the fish do not react to these 3 factors. The fishermen have observed, however, that the fish have a different type of behaviour in each locality.

Because fish in one water mass are hesitant to enter another and therefore tend to congregate near the boundaries of the first water mass, it is believed that the fish are sensitive to differences in temperature that occur in the tide lines (boundaries) between water masses. These boundaries develop at different stages of the tide and in different localities. Consequently, fish may be found, at high tide, in one place and, at half tide, in another. In these cases, the fish are sensitive to both the water temperature and the tide stage, but the present data are not sufficiently detailed to show this situation.

2.01 (Cross Reference: 3.17)

Results. -- In the first experiment, it was found that the fish that had been kept alive in sea water containing 1 p.p.m. of aureomycin had 100,000 bacteria per gram and 0.22 p.p.m. of aureomycin in the viscera.

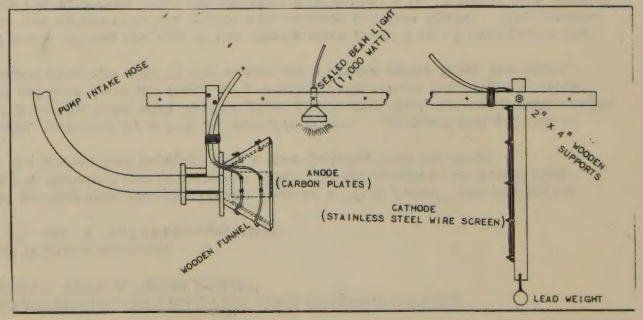
Since an appreciable bacterial count was obtained when 1 p.p.m. aureoymcin was present in sea water, further experiments were made in which 5 p.p.m. were added. The respective bacterial counts were 50,000 and 48,000 per gram and the aureomycin content was 0 and 1.2 p.p.m. in the viscera of fish that had been kept in ordinary sea water and in sea water containing 5 p.p.m. aureomycin.

Conclusions. ---Although only a few tests have been made, the results indicate that aureomycin penetrates the viscera of living fish, but that it probably has either no effect in decreasing the number of bacteria present or that it has only limited bactericidal effect. In view of the general sensitivity of marine bacteria to aureomycin, it would appear either that the visceral organisms were so located that the aureomycin did not reach them or that the viscera contained organisms that were rather resistant to the antibiotic.

2.14

When the water surface was relatively calm, fish in the vicinity of the gear could be observed from the deck of the Cobb. Small fish (averaging 3 inches) approached the light from below and apparently did not notice the electric current until they were well into the field. They then turned toward the anode and swam up to the end of the intake hose. Stunning occurred when they advanced to within a few inches of the anode plates, where they were carried along with the water being pumped in through the hose. During the more spectacular tests, a continuous stream of fish came through the phases just outlined -- as high as 1,178 fish per minute for 30 minutes being taken. Larger fish were observed at the periphery of the lighted area, but only a few from 6 to 8.7 inches in length were caught.

Damage was inflicted on the fish either by the electric shocks, by the pump itself, or by both, as an estimated 60 percent of the fish were either dead or dying upon arrival in the holding tank.



3.230 TECHNIQUES OF FREEZING AND STORING FISH AND SEAFOOD

Butler, Charles (U. S. Fish and Wildlife Service, Washington, D. C.)
Frosted Food Field XX, No. 3, 80-82 (March 1955)

The goal of fish and shellfish refrigeration is to produce a product that retains the maximum amount of the desirable palatability characteristics of the strictly fresh product. The practical aim is to retain the natural characteristics by inhibiting autolytic and bacterial activity and by inhibiting changes in appearance, structure, and palatability due to the process itself.

Critical factors. -- Based on the findings of research, it is now generally believed that the following are the most critical factors in the successful freezing of fish and shellfish: (1) The initial high quality of the product; (2) the maintenance of the proper low, and reasonably constant, frozen storage temperature in the initial warehouse, during transportation, in the in-transit warehouse, and in the retail display cabinet; and (3) the time required for the product to pass through the temperature range of 30° to 25° F. during freezing. This time should be kept at a minimum for maximum quality preservation.

The quality of the fishery product when it goes into frozen storage depends on the number and kind of bacteria allowed to remain on the fish after dressing and by the time elapsed between the death of the fish and its preservation by freezing.

Bacterial spoilage. -- The process of bacterial spoilage appears to be a combination of the actions of the enzymes in the flesh and the bacteria on the fish surfaces. The effect of these combined actions contributes to the series of changes in texture, color, odor and flavor that take place during spoilage.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.234 THE EXPRESSIBLE FLUID OF FISH FILLETS. I. NUCLEIC ACID AS AN INDEX OF CELL DAMAGE IN FILLETS FROZEN FROM BOTH SIDES

Love, R. M. (Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 6, No. 1, 30-37 (January 1955)

It has been generally accepted that rapidly frozen muscle retains much of the microscopic appearance of unfrozen tissue, the ice particles formed being numerous, very small, and contained wholly within the fibers. On thawing the muscle, the water, being already in situ, does not to any appreciable extent escape as "drip." However, Hiner, Madsen and Hankins (1945) concluded from microscopic examination of frozen meat sections that rapid freezing caused more damage to the individual cells than slow freezing, as a result of the expansion of the intracellular fluid. More recently, Woolrich (1948) concluded that cells were not split in freezing, except where the tissue had been mishandled.

The object of the present work was to re-examine the question of tissue damage in freezing in order to find, if possible, which of the conflicting views was correct. The author's approach was to demonstrate the presence of cell components, in particular deoxypentosenucleic acid (DNA), in fluid expressed from cod fillets, on the assumption that they would appear only when the muscle fibers had been burst open, and so provide an index of cell damage.

If it is assumed that cell damage increases with the freezing rate, then a corresponding increase in expressible-fluid nucleic acid might be expected. The results of a preliminary experiment (table 1) show this to be so, except for the unexpected drop in the most rapidly frozen group.

(over)

 ABSTRACTER: Roy C. Stevens

3.26 TRANSPORTATION OF FROZEN FISH, SEAFOOD PRODUCTS: COSTS AND QUALITY MAINTENANCE

Bowling, Charles B. (Freight Rate Service Branch, Agriculture Marketing Service, U. S. Department of Agriculture)
Frosted Food Field XX, No. 3, 85 (March 1955)

Basically there are two factors involved in the transportation of fishery products: (1) the maintenance of quality during transportation, and (2) keeping the cost of the transportation at a low level.

The economics of distribution cannot be minimized. Distribution costs often make the difference between profit and loss. Transportation charges account for a major part of distribution costs. Thus, the question of whether a distributor can remain in business may depend on reasonable transportation costs.

The following is a list of practices that industry should follow in order to preserve fish and shellfish quality during transportation:

"1. Shippers should inspect transportation equipment in which their merchandise is to be transported. This applies to carloads or truck loads.

2. Truck equipment should be supplied with floor racks and lading should be placed so as to allow air circulation throughout load.

3. To check mechanical refrigeration to see if it is adequate to assure proper refrigeration of the

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.236 PROPOSED STANDARDS FOR FISH STICKS

Anonymous
Fishing Gazette 72, No. 25, 44-45, 68 (March 1955)

In February, the Fish Stick Committee of the National Fisheries Institute requested the Fish and Wildlife Service to issue voluntary standards for fish sticks and to make available a grading and inspection service for voluntary use by the industry.

Since then the committee, with the aid of the Fish and Wildlife Service technologists, has developed and proposed standards for grades of frozen, fried fish sticks, and has approved a set of specifications covering fish blocks as raw material for fish sticks. Copies of the proposed standards can be obtained from the National Fisheries Institute.

As the Fish and Wildlife Service has no authority to set up any inspection service, they will probably have to request the authority from Congress.

It is expected that a packer may certify his product to be any given grade. Inspection by the government agency can be made in the plant, but self-grading by the packer and certification by lot is more likely to be the practice.

Quoted here is the product description for frozen, fried fish sticks and the proposed standard for grade AA.

"A. Product Description and Grades
Sec. 1. Product description. Frozen fried fish sticks are prepared from uniformly, rectan-

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.26

entire load. Supplement with dry ice, if necessary.

4. Equipment should be precooled. If water ice is used, check drains for stoppage; see plugs fit securely in ice bunkers.

5. Pre-cool refrigerator cars at least 24 hours during warm to hot weather.

6. Do not spare ice and salt during warm to hot weather. A few extra dollars for ice and salt may be the difference of partial defrosted merchandise or complete spoilage.

7. Check location of icing stations en route to destination to see if properly spaced to insure re-icing every 12 to 16 hours, at least during hot weather.

8. Avoid circuitous routings.

9. Trucks are susceptible to a tremendous amount of heat over the highways during hot weather. Check for unreasonable layovers on long haul shipments.

10. The shipper is generally held responsible for condition of merchandise on arrival at destination. An ounce of prevention will save claims and a disappointed customer."

3.230 (Cross References: 3.239, 2.00)

Although the visual and olfactory changes caused by bacterial spoilage vary somewhat with each fishery product, the changes in fish held under the best conditions of sanitation usually follow a definite pattern.

The changes in haddock can be used as an example of this pattern. In the first stage the characteristic odor of the species is gradually lost. This takes about 5 or 6 days. During the second stage -- from the 5th to the 10th day -- the odor develops through a slightly sweet, musty, yeasty, sour milk and finally stale or slightly "fishy" odor. In the final stage, the odor of the by products from the decomposition becomes dominant. Characteristics odors range from definitely stale through sour, sulphide or rotten cabbage, ammoniacal, and finally to nauseating and putrid.

Oxidative spoilage. -- Spoilage of high oil content fish also includes the development of rancidity, sometimes called a "saltfish" odor. This type of spoilage results from oxidation of the fat or oil. Fish are especially susceptible to rancidity because they contain highly unsaturated oils. Other oxidative changes in addition to rancidity include: (1) the fading or change of color of the fish flesh, and (2) the development of off colors, such as the yellowing or "rusting" of halibut.

Denaturation. -- In addition to bacterial decomposition and oxidative changes, frozen fish are susceptible to irreversible protein changes known as denaturation in which liquids are lost from the tissues and not reabsorbed. Methods that can be used to minimize the effects of denaturation include: (1) brining, (2) keeping the period from death to freezing at a minimum, and (3) keeping storage temperatures at the lowest practical level.

3.236 (Cross References: 7.73, 9.3)

gularly shaped portions of fish flesh cut or sawed from frozen blocks of edible fish fillets essentially free of skin, bone, and any adulterant; are coated with batter and/or breading; are cooked by frying in an edible cooking oil or fat; are quick frozen and maintained at temperatures necessary for the preservation of the product. All sticks in an individual lot are prepared from the flesh of only one species of fish, and the common name of the species is carried in the ingredient legend. The number of sticks and the net weight are displayed prominently on the front panel of the package. The sticks have the average weight of not less than 2/3 oz. and not more than 1 1/2 oz. per stick with due allowance for normal processing variations. The largest dimension of each stick is at least three times the next largest dimension.

Sec. 2. Grades of frozen fried fish sticks.

(1) 'Grade AA' is the quality of frozen fried fish sticks that possess very good appearance, flavor, odor, and character, and are practically free from defects; and that score not less than 90 points when scored in accordance with the system outlined in these standards."

3.234

Figure I shows that, whatever the rate of freezing, the fluid expressed from previously frozen cod fillets always contains more DNA than that from unfrozen fillets. The sudden large increase in DNA that is seen to occur, reaching a maximum at 131 minutes, is thought to be caused by the change-over from intercellular to intracellular freezing. The ice masses which first form within the cells are so large that they burst the sarcolemmas, liberating, among other things, nuclear material into the interstitial spaces. It is thus found in the expressible fluid. When the freezing rate is increased further, the ice masses become smaller and cease to burst the cells, as shown by microscopic examination and by a corresponding drop in DNA.

The author emphasizes that these phenomena apply only to fillets frozen from both sides. A future paper will describe the effects occurring in fillets frozen from one side only.

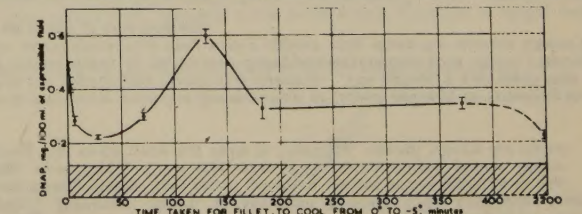


Fig. 1.—*Deoxypentosenucleic acid phosphorus (DNAP) in the expressible fluid from thawed cod fillets that had been frozen at different rates; that from unfrozen fillets is represented by the shaded area.*

Table I

Deoxypentosenucleic acid phosphorus (DNAP) in the expressible fluid of cod fillets treated in different ways

Treatment	Expressible fluid as loss of wt., %	DNAP (mg. per 100 ml. expressible fluid)
Unfrozen	9·5	0·150
Frozen in still air at − 10°	10·3	0·209
Frozen in still air at − 30°	9·1	0·404
Frozen in air-blast at − 30°	10·4	0·628
Frozen in powdered solid CO_2 at − 78°	10·2	0·324

8.64 VITAMIN CONTENT OF FISHERY BYPRODUCTS. PART 2. VITAMIN B_{12} IN PACIFIC SARDINE (SARDINOPS CAERULEA) ORGANS AND RIBOFLAVIN, NICOTINIC ACID, AND VITAMIN B_{12} IN ALBACORE TUNA (GERMO ALALUNGA) ORGANS

Karrick, Neva L. (U. S. Fish and Wildlife Service, Seattle)
Commercial Fisheries Review 17, No. 2, 8-11 (February 1955)

Two hundred Pacific sardines, all taken from a single catch made in December 1951, were used in this study. The vitamin B_{12} content of the sardine organs and of the whole sardine is given in table 1.

Albacore caught southwest of San Diego in August 1953 were used to study the distribution of vitamin content in the various organs and to study the effect of the degree of freshness upon the vitamin B_{12} content of the organs. These results are given in table 2.

Within the limitations of the scope of this study, the author made the following conclusions:

"1. The organs of the Pacific sardine can be arranged in the following order with respect to decreasing vitamin B_{12} content: kidney, liver, heart, gonads, spleen, pyloric caeca, stomach, and intestinal tract.
2. In the organs of the albacore tuna, the riboflavin and the vitamin B_{12} contents are highest in the liver and the heart and lowest in the intestinal tract. The nicotinic acid content of the organs is approximately the same in all organs.
3. The contents of riboflavin, nicotinic acid, and vitamin B_{12} in the albacore tuna organs apparently are not affected by their degree of freshness."

(over)

 ABSTRACTER: D. T. Miyauchi

8.42 SODIUM CONTENT OF FOOD

Clifford, Paul A. (Division of Food, Food and Drug Administration, Washington, D. C.)
Journal of the American Dietetic Association 31, No. 1, 21-27 (January 1955)

The value of low-sodium diets seems to have been proved. The successful application of such diets, however, depends fundamentally on the knowledge of the sodium content of foods. As the physician now prescribes diets that represent varying degrees of sodium restriction, the admonition "to cut out salt" is not a sufficient directive.

The dietitian must, on the basis of present knowledge, devise adequate and attractive diets that fulfill the prescribed levels of restriction. People -- though in ill health -- still crave meats, milk, and other high-quality protein foods that normally contain an appreciable amount of sodium. They also want the pastries and desserts that make the low-sodium regimen more bearable.

In consequence of these demands, much research has been devoted to the problem of reducing the sodium content of foods without reducing their nutritional value. Consequently, a variety of low-sodium foods is now readily available. Manufacturers of these special products have made a valuable contribution to public health.

In the past, the analysis for sodium in foods was primarily a part of a general analysis of the composition of food. As sodium was only of incidental interest, a relatively rough approximation was adequate for the purpose.

This situation changed when it became necessary to devise nutritionally adequate daily diets containing as little as 500 milligrams of sodium. The older values for sodium content of food were

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 ABSTRACTER: Kathryn L. Osterhaug

8.7 VOLUNTARY STANDARDS AS AN AID IN MERCHANDISING

Anderson, A. W. (Branch of Commercial Fisheries, U. S. Fish and Wildlife Service, Washington, D. C.)
Southern Fisherman XV, No. 3, 22, 44, 80-82 (March 1955)

To establish a standard is simply to set up a measure by which the producer, processor, distributor, and consumer can judge the product involved. Grades in a standard merely represent the position of a product on a scale based on certain inherent physical characteristics. Although a standard may be considered as a yardstick for measuring quality, it may also cover other factors such as size and packaging.

Standards may be either voluntary or mandatory. Most standards are voluntary, but their obvious advantages usually cause them to be used extensively.

Arguments for voluntary standards. -- Based on experiences in the agricultural field, standards are said to stabilize production, simplify processing, promote orderly marketing, and efficient trading. They assure both the buyer and consumer that purchased products are of a certain quality, type, and condition. Standards usually save money for everyone concerned.

Standards provide a sound basis for contract negotiation between buyers and sellers even at great distances, since standards constitute a universal and legal language in all parts of the country. Most disputes can be settled readily by inspection based on the known and accepted provisions in the standards.

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 ABSTRACTER: Kathryn L. Osterhaug

8.8 OUTLINES OF A LONG-RANGE FROZEN FISH PROGRAM FOR THE ARMED FORCES

Peterson, Stanley R. (Food and Container Institute, Office of the Quartermaster General, Chicago)
Commercial Fisheries Review 17, No. 1, 1-7 (January 1955)

The author proposes a long-range program for the application of recent technological advances to the production and handling of frozen fish that is to be used in Armed Forces feeding. The program involves: (a) determination of relative consumer preference for various species of fish caught at different periods of the fishing season; (b) determination of storage life of acceptable species of fish when caught at different periods of the fishing season; and (c) determination of a feasible method for ascertaining freshness in frozen fish.

It has been demonstrated that relative consumer preference for various species of fish varies with different periods of the fishing season. Accordingly, the sampling procedure has been worked out in table 1.

If feasible, 1-, 3-, and 7-day-old fish would be secured from all the species to be tested at the different periods of the year. These fish would be processed into frozen fillets or steaks for relative consumer preference tests and for technological examination. For example, from a 200-pound lot of frozen fillets processed from 1-day-old haddock, 150 pounds would be shipped to Fort Lee, Virginia for consumer preference tests, and the remaining 50 pounds would be shipped to the Institute for technological examination. The greatest portion of the 50-pound sample would be utilized in a storage study. In determining the relative consumer preference of each species, not only period of capture would be considered, but also the varying degrees of initial freshness. Regional preferences of the consumer respondents would also be considered.

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 ABSTRACTER: Roy C. Stevens

8.7

Since standards are established with the aid of industry, they are usually readily accepted.

Need for voluntary standards for fish. -- The fishing industry is becoming increasingly aware of a need for voluntary standards for fishery products. The following reasons probably account for this need:

"1. It has become apparent to those buyers who handle both fishery and agricultural products, that the standards and inspection service available for agricultural products have made marketing easier and encourage a better and more uniform product, which is easier to sell.
2. Most imported fishery products are subject to foreign standards and inspection which has made them, in many instances, more readily salable items than the competing domestic products.
3. Breaded shrimp, a new and most promising development, varied so widely as a product, that its market potential could not be fully realized and might even have been endangered.
4. The blue crabmeat industry on the Atlantic Coast was confronted with marketing regulations, which required an assessment of current production practices.
5. Packers of canned Maine sardines, seeking to improve their products and increase and stabilize their markets, concluded that the establishment of standards was a first step.
6. Gulf and Mexican shrimp producers likewise concluded that the development of, and adherence to, standards was a necessary adjunct of a progressive shrimp industry.
7. The results of the 'cuttings' of various fishery products at the annual conventions of the National Fisheries Institute demonstrated conclusively that product improvement and standardization were obvious needs.
8. And finally, Public Law 466, 83rd Congress, popularly referred to as the Saltonstall-Kennedy Bill, provides funds 'to promote the free flow of domestically produced fishery products in commerce' and 'to develop and increase markets for fishery products of domestic origin.' Standards, by definition and by application, provide a way to achieve both these objectives by means of more orderly and more efficient buying and selling."

8.8 (Cross Reference: 3.26)

A specific method for determining freshness in frozen fish has not yet been adopted.

Table 1 - Elements of a Sampling Procedure

A. Species	B. When Caught	C. Designated Periods for Obtaining Samples	D. Main Fishing Season	E. Spawning Season	F. Size of Fish for Selected Samples
Haddock	All Year	1. Late Jan. 2. Late May 3. Late Sept.	March thru May	Late Feb. to Early May	3-6 lbs.
Mackerel	April to Nov.	1. Early May 2. Late July 3. Mid-Sept. 4. Mid-Nov.	Sept. Oct.	April thru June	1-3 lbs.
Salmon, silver	June to Nov.	Troll-Caught: 1. Late June 2. Mid-Sept. 3. Late Oct. Seine-Caught: 1. Late Sept. 2. Late Oct. Gill-Net Caught:[1] 1. Late Aug. 2. Late Sept. 3. Late Oct.	July thru Oct.	Sept. to Nov.	6-10 lbs.

[1] Subject to seasonal fishing regulations for the various districts.

8.64 (Cross References: 1.1, 1.2, 6.59)

Table 1 - Vitamin B_{12} Content of the Pacific Sardine Organs and of the Whole Sardine

Material[1]	Vitamin B_{12} Content
	Micrograms Per Gram (Wet Basis)
Kidney	1.48
Liver	0.43
Heart	0.35
Gonads	0.23
Spleen	0.095
Pyloric caeca	0.08 to 0.29[2]
Stomach	0.04 to 0.19[2]
Intestinal tract	0.02 to 0.09[2]
Whole sardine	0.17

[1] The organ samples were composites from 100 sardines; the whole-fish sample was a composite from another 100 sardines.
[2] The "apparent" B_{12} content is reported for these particular organs because results varied when different concentrations of extracts of the samples were assayed. Results obtained at a given concentration were in agreement but those obtained at different concentrations did not check.

Table 2 - Riboflavin, Nicotinic Acid, and Vitamin B_{12} Content of the Organs of the Albacore Tuna

Organ	Lot	No. of Fish	Condition of Fish From Which Organs Were Taken	Vitamin Content		
				Riboflavin	Nicotinic Acid	Vitamin B_{12}
				(Micrograms Per Gram--Wet Basis)		
Liver	A	23	Fresh	7.6	55	0.89
	B	20	Slightly stale	7.3	52	0.84
	C	30	Stale	7.0	63	0.46
Average				7.3	57	0.73
Heart	A	23	Fresh	7.3	51	1.04
	B	20	Slightly stale	6.8	46	0.94
	C	30	Stale	7.1	40	0.81
Average				7.1	46	0.93
Spleen	A	23	Fresh	3.2	44	0.36
	C	30	Stale	4.6	72	0.37
Average				3.9	58	0.37
Stomach	A	23	Fresh	3.3	36	0.18
	B	20	Slightly stale	3.3	35	0.21
	C	30	Stale	3.6	47	0.21
Average				3.4	39	0.20
Intestinal tract	A	23	Fresh	1.6	48	0.13
	B	20	Slightly stale	1.7	49	0.10
	C	30	Stale	2.3	60	0.23
Average				1.9	52	0.15

8.42 (Cross References: 3.39, 0.4)

found to be unreliable, and it was realized that the whole subject needed a thorough re-appraisal. Regulatory chemists found themselves in need of better analytical methods in handling the many low-sodium foods that began to appear on the dietetic market.

Chemists and dietitians attacked the problem, and new tabulations of the sodium content of foods began to appear, A study by Bills and his coworkers listed the sodium content of some 500 foods and about 150 public water supplies. These investigators made their analyses by use of the flame photometric technique and contributed greatly to its development. Bills' tabulation of sodium values filled an acute need. Other investigators contributed further and helped to supply more of the needed data.

In July 1954, a report was completed by the Food and Nutrition Board of the National Research Council. It is a factual appraisal of low-sodium therapy in its over-all aspects. Included in the report is a table, entitled "Estimated Best Values of the Sodium Content of Foods," that gives sodium data for 264 staple dietary items.

Table 1

Food	Sodium *	Food	Sodium*
Fish and shellfish		Oysters, raw	variable
Bluefish, raw, unsalted	68	Rockfish, raw, unsalted	45
Catfish, raw, unsalted	60	Salmon, raw, unsalted	50
Codfish, raw, unsalted	65	Canned, without added sodium	60
Crab, boiled	370	Canned	540
Flounder, raw, unsalted	68	Sardines, canned	550
Halibut, raw, unsalted	56	Shrimp, raw	140
Herring, raw, unsalted	100	Tuna, canned	800
Lobster, boiled	250	Canned without added sodium	50

* mg. /100 gm.

9.3 LABELING FOODS OF LOW SODIUM AND LOW CARBOHYDRATE CONTENT

Nelson, E. M. (Division of Nutrition, Food and Drug Administration, Washington, D. C.)
Journal of the American Dietetic Association 31, No. 1, 33-36 (January 1955)

A section of the Food, Drug, and Cosmetic Act, passed in 1938, reads as follows:

"A food shall be deemed to be misbranded if it purports to be or is represented for special dietary uses, unless its label bears such information concerning its vitamin, mineral, and other dietary properties as the Secretary determines to be, and by regulations prescribes as, necessary in order fully to inform purchasers as to its value for such uses."

This section of the Act gives the Secretary authority to set up regulations for labeling foods that are offered for some special dietary use and to require that the labeling be informative to the purchaser.

In 1952, a survey was made in which labels indicating that the food in the container was intended for individuals who were restricting their salt intake were collected from 136 foods. Of these, only a third bore a quantitative declaration of salt content. In addition, many of the statements relating to reduced sodium content were misleading.

"Salt free" was probably the most misleading statement as there are other sources of sodium than salt which might make the food unsuitable for use in a therapeutic diet. Such expressions as "no salt added" and "packed without added salt" are more informative. The terms "low salt" or "low sodium" are meaningless if they are not accompanied by a quantitative declaration of sodium content.

Sodium can be introduced into food by several different methods. These include the addition of table salt and of sodium glutamate for flavoring, the addition of sodium propionate and sodium di-

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 ABSTRACTER: Kathryn L. Osterhaug

9.17 THE EFFECTIVE MANAGEMENT OF MARINE FISHERIES

Idyll, C. P. (University of Miami Marine Laboratory)
Southern Fisherman XV, No. 3, 28, 72, 76 (March 1955)

To understand the problem of management of marine fisheries, it is necessary to understand the terms "depletion," "overfishing," and "conservation."

Depletion has a double meaning: (1) the economic definition where depletion takes place as soon as costs exceed income from catch and it becomes unprofitable to fish, and (2) biological depletion that occurs when the abundance of fish is reduced so an optimum steady yield cannot be realized. Biological depletion frequently occurs at a different level of abundance than economic depletion. For example, a fishery enjoying a good market may make a profit and not be depleted economically, while catches are low as a result of severe biological depletion.

Overfishing is related to biological depletion; it is a rate of fishing that reduces the abundance of a fish population to a point where it yields less than its optimum.

Conservation is the establishment of the level of fishing that would ensure the optimum yield year after year.

Under the modern concept of conservation, underfishing represents just as large a waste as overfishing. In mineral conservation there is no such thing as underexploiting. If fish are not caught they die, but it is not wise to catch a whole fish population -- some must be left for reproduction. The difficulty of fishery conservation is trying to establish a balance between underfishing and overfishing.

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 ABSTRACTER: Lois Elgin

9.14 PELLETED FISH FOOD DEVELOPED

Anonymous
Feedstuffs 26, No. 51, 7 (December 18, 1954)

Michigan State College reports that a new pelleted fish food has been developed for feeding hatchery fish. It is believed that this food will result in larger, better-colored, and better-tasting trout. Also, the new pelleted food should reduce the cost of feeding hatchery fish by as much as $50,000 per year in the state of Michigan.

The new pelleted food is composed of grain and vegetable material to take the place of the previously used liver and meat ration, which has been standard in hatchery feeding for the past 10 years. The food was developed by E. G. Grassl, a full-time employee of the Michigan Conservation Department and by a graduate student in nutrition at Michigan State College. The experiments that led to the development of the pelleted food were carried out at Wolf Lake and Marquette fish hatcheries.

The pelleted food was developed primarily for feeding trout, but bait minnows and warm-water fish have also received it as food. The ingredients used in making the pelleted food have not been revealed. It can be stored without refrigeration and without the necessity for thawing and trimming as is necessary with the previously used meat ration.

 ABSTRACTER: Martin Heerdt

9.7 SHORT COURSE FOR BRITISH COLUMBIA FISHERMEN

Anonymous
Western Fisheries 49, No. 5, 42 (February 1955)

The University of British Columbia Extension Department has plans for a two weeks' course to be given to a limited class of 30 professional fishermen. Students preferred for the course are those who are willing to convey the information they receive to other fishermen in their area.

There will be no cost to the students, since they will receive free room, board, and tuition. The students will be chosen from those recommended by various fisheries organizations.

The tentative program of possible subjects to be taught is as follows:

Technology

(a) Gear, both Canadian and that of other countries -- construction, care, and preservation
(b) Boat design
(c) Boat care; borers; fouling; disinfection
(d) Engine care and operation
(e) Fish detection apparatus
(f) Navigation, continuing present courses

Biological

(a) Principles of conservation
(b) Problems and progress of investigations in fishery biology

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 ABSTRACTER: F. Bruce Sanford

9.7

(c) Improvement in quality of fish
(d) Problems and progress of investigations in processing of fish
(e) Log keeping

Oceanography

Ocean temperature, salinities, turbulence, upwelling, currents, sea bottom contours. Animal and plant populations; basic fish food supplies.

Economics

(a) Economics of fishing industry -- production and distribution, markets
(b) Loans -- for boat construction
(c) Off-season employment

Commerce

(a) Bookkeeping, accounting
(b) Income tax

Law

Some aspects of international law in relation to the fisheries; internal agreements, treaties, commissions.

Safety and first aid

(a) Resuscitation in drowning
(b) Various accidents -- jellyfish poisoning -- fish poisoning
(c) Fire protection
(d) Shipwreck and rescue.

9.3 (Cross References: 3.39, 3.29)

acetate for the prevention of mold growth and "rope formation" in bread, and even the addition of milk powder to a formula. Water, too, can be an important source of sodium in foods processed in certain areas.

Brine is often used in processing food before freezing. An incident involving frozen lima beans purchased for use in low-sodium diets was the cause of the following action which was published in the Federal Register, November 14, 1953.

"In a number of diseases or disease conditions it is important to restrict the intake of sodium. Sodium occurs in all natural foods, but added salt makes the most important contribution to the total sodium intake in the diet. Most fresh vegetables are of low sodium content and consumers generally regard frozen vegetables as being free of added salt and suitable for use in low-sodium diets. While salt may not be added directly as a seasoning ingredient during the processing of frozen vegetables, the use of salt brine in quality separation of such vegetables as peas and Lima beans preparatory to freezing may contribute substantial amounts of salt to the finished article.

The failure of the labels of frozen vegetables to declare the presence of salt has been the basis of complaints to the Food and Drug Administration.

Section 403 (i) (2) of the Food, Drug, and Cosmetic Act requires the label of a fabricated food to bear the common or usual name of each ingredient present. The Department of Health, Education, and Welfare regards any frozen vegetable containing salt, added directly or indirectly, as misbranded in violation of section 403 (i) (2) of the Food, Drug, and Cosmetic Act unless its label names salt as an ingredient."

9.17

Fishery management is the manipulation of fishing effort to ensure that the population yields the maximum amount of fish, by weight, permanently. The fish must also arrive at markets when they can be absorbed. Good fishery management should also be prepared to impose restrictions on over-exploitation. Whenever a stock is yielding less than its maximum, management is necessary to increase catches through the development of new ways of detecting and catching fish. Management can also aid the industry by the discovery of new fishing grounds.

Effective management can best be accomplished after scientific study of production records, and after study of the biology of the fish proves the control necessary. Methods of restriction include (1) closed seasons, (2) closed areas,(3) size limits, (4) mesh limits, (5) catch or bag limits, and (6) gear restrictions. Which control or controls are used should depend upon scientific study. Fisheries should be managed for the benefit of the fisherman and not for the fish. If all these precautions are followed, it seems the way has been pointed toward effective management.

7.611 RAPID ASSAY FOR VITAMIN A

Scott, Nathan
Chemist Analyst 43, 97 (1954)
Chemical Abstracts 49, No. 3, 1854 (1955)

The analysis is carried out in a Maizel-Gerson sapon. vessel or in a glass-stoppered conical centrifuge tube. Take enough sample to correspond to about 100 U.S.P. units of vitamin A. Dil. high-potency samples with $CHCl_3$ and take a suitable aliquot. Heat in a water bath and add from a pipet 0.35 ml. of 50% KOH in EtOH + 5 ml. of EtOH. Mix well, attach an air condenser, and reflux for 15 min. on a steam bath. Cool, dil. with 5 ml. of water, and add 10 ml. of Et_2O. Centrifuge and remove all but 1 drop of the aq. layer with a thin needle, syringe, or vacuum pump. Add 5 ml. of water, again stopper, and shake for at least 30 sec. Centrifuge and remove all but the last drop as before. Wash with 2 more 5-ml. portions of water. Finally evap. the Et_2O with a stream of N_2 directed by hypodermic needles attached to rubber tubing. Add 10 ml. of iso-PrOH and shake well. Transfer to cuvettes, set the spectrophotometer to 100% transmission with the blank; take readings at 310, 325, and 334 mμ and apply the Morton-Stubbs correction. The results of 4 analyses with different samples show fair agreement with results obtained by the U.S.P. method. The vitamin A solns. should not be exposed unnecessarily to light or allowed to stand too long.

Reprinted in whole

7.51 CHEMICAL METHOD FOR MEASURING RELATIVE DIGESTIBILITY OF ANIMAL PROTEIN FEEDSTUFFS

Gehrt, Albert J.; Caldwell, M. J.; and Elmslie, W. P. (Moorman Manufacturing Co., Quincy, Ill.)
Journal of Agricultural and Food Chemistry 3, No. 2, 159-162 (February 1955)

Feedstuffs are commonly sold on specification and are analyzed for moisture, protein, fat, fiber, and, in many samples, mineral elements and vitamins. However, the usual chemical analyses do not give complete information on feedstuff quality -- the digestibility of the protein must also be ascertained.

The authors have developed a method for determining the amounts and nature of indigestible fractions of animal proteins. Four major steps are involved: (1) Fat is removed from the sample by solvent extraction. (2) Meat and light impurities are separated from bone and heavy impurities by flotation in carbon tetrachloride. (3) The meat fraction (including light impurities) is digested in a warm acid solution of pepsin. (4) The heavy residue from step 2 is treated with 1 to 1 hydrochloric acid to dissolve the bone and is then washed, dried, weighed, and examined under a microscope.

The indigestible residues remaining consist predominantly of vegetable fiber, hoof, colloidal organic matter, hair, fuzz, and charred meat. Indigestible residues in meat scrap range from 2 to 25 percent, seldom exceeding 10 percent in samples of good quality. Limited studies on fish meal show a high degree of digestibility, unless the product has been overheated.

Reproducibility of the method is said to be good, with less than one percent difference between duplicate samples.

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ABSTRACTER: Roy C. Stevens

7.80 IMPROVEMENT IN QUALITY OF ICED FISH

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 25-26 (1954)

The relationship between test-panel estimates of quality and the total volatile base and trimethylamine content of fish flesh was studied as a means of determining quality. Large variations in the rate of spoilage were observed in different catches of codfish stored in ice under identical conditions. However, the relationship between the flavor score of the cooked fish and the total volatile base content of the raw flesh was the same in 3 lots of fish taken in the North Sea and off the Lofoten Islands and Spitzbergen. The relationship may be stated as

$$F + 6.2 \log_{10} (1 + V) = 15$$

in which F equals the flavor score (0 to 10) and V equals total volatile base nitrogen (milligrams of nitrogen per 100 milliliters of muscle juice). These results indicate that the amount of total volatile base may eventually provide a satisfactory chemical index of general quality. Nevertheless, rating of quality by a trained panel will continue to be the yardstick against which all objective methods must be tested.

A simple and rapid objective test is needed to check the market quality of fish. One of several possible tests being considered has shown promising results. This test is based on the fact that the eye lens of cod and haddock stored in ice becomes progressively more turbid as water diffuses through the cornea and gradually denatures the proteins of the lens. A series of artificial standards of graded opacity is being used for comparison with the fish lenses. The results between individual fish are widely scattered, but the average score for a dozen similarly treated fish is reproducible. The

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ABSTRACTER: Martin Heerdt

7.80 THE "VOLATILE REDUCING SUBSTANCES" TEST FOR FISH FRESHNESS

Schmidt, P. J. and Mayoh, H. M. (Pacific Fisheries Experimental Station)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 102, 22-23 (March 1955)

Experiments were made with fresh salmon to determine how closely volatile-reducing-substances (VRS) values correlate with organoleptic ratings.

Procedure. -- Fresh salmon were stored in two ways: Some were stored in ice in an insulated box with drainage facilities, while others in the same lot were stored at 38° F. without ice.

At intervals, two fish from each lot were cut up, canned, and heat processed as usual. (The VRS values obtained with the canned fish were not significantly different from those obtained with fresh fish. Experimental fish were therefore canned prior to testing because liquid could be more readily obtained on pressing them.) Round sockeye, gutted coho, and gutted chum salmon were stored and tested by the VRS method.

Results. -- The results are given in the accompanying table.

Conclusions. -- These experiments indicated that when the VRS value exceeded 30, the fish were stale or spoiled. However, high values were not always reached, even when the fish were stale. With gutted chum and coho salmon stored in ice, the VRS value was not a good index of the state of preservation. Values obtained with gutted fish were sometimes erratic. For example, with chum salmon, the VRS value after the fish had been 12 days in ice and were stale was only slightly higher than that obtained with the fresh fish.

(over)

ABSTRACTER: F. Bruce Sanford

7.80 (Cross Reference: 2.00)

average opacity of the lenses from fish packed in ice form a straight line when plotted against the time in ice, over the interval of 0 to 17 days. It is usually possible to estimate the time that a lot of fish has been in ice within one day if the air temperature is fairly constant and if none of the fish are exposed. About 20 minutes time is required to remove and match the lenses from 12 fish.

Replicate organoleptic and chemical tests have indicated that iced cod 44 to 52 centimeters in length spoiled significantly faster after the 13th day than did iced cod 58 to 61 centimeters in length.

Two experiments were conducted to compare the keeping quality of line-caught codling and trawl-caught codling of the same size, maturity, and sex. According to the chemical and organoleptic data obtained, the trawl-caught codling spoiled more rapidly, particularly after the 10th day in ice. Bacteriological examination showed that the trawl-caught codling carried significantly larger viable counts of bacteria in the surface slime than did the line-caught codling. After 10 days, however, the counts were similar.

7.80

The results of some of the tests made with sockeye, coho and chum salmon.

Storage time, days	VRS value when stored: at 38° F. in air		in ice	
Sockeye stored in the round 1/2 day after catching				
0	3.2		3.2	
1	7.4		—	
3	19.8		4.2	
5	52.2	(judged spoiled)	—	
6			8.6	
8			18.4	
10			12.2	
14			49.8	(judged stale)
16			54.2	
Coho, gutted and stored 1 day after catching				
0	5.5		5.5	
5	30.2	(judged stale)	5.6	
7	66.0	(judged spoiled)	—	
9			9.2	
12			11.6	(judged stale)
Chum, gutted and stored 2 days after catching				
0	7.95		7.95	
2	7.60		—	
5	53.8	(judged spoiled)	7.90	
8			14.4	
12			9.05	(judged stale)
15			14.9	

7.51

Table II. Typical Results of Pepsin Digestion Test

	Meat Scrap				Fish Meal		Blood Meal	
	Good quality	Fair quality	Poor quality	Fertilizer Tankage	Properly cooked	Overheated in transit	Good quality	Poor quality
Fat, %	8.6	12.1	5.7	10.8	9.9	6.7	0.1	0.3
Pepsin-indigestible residue (from light fraction), %	4.2	11.8	20.6	30.0	8.5	43.8	0.3	13.8
Acid-insoluble residue (from heavy fraction), %[a]	1.1	0.3	2.4	1.1	0.8	0.6	0.1	0.7
Protein, %								
In original sample	52.8	57.1	52.0	49.9	60.9	61.7	89.3	75.3
In indigestible residue	45.8	37.5	63.0	52.5	59.7	80.6	...	88.2
Feedstuff protein digested by pepsin, %[b]	96.4	92.3	75.0	68.4	91.6	43.0	99.7	83.9
Approximate Percentage Composition of Pepsin-Indigestible Residue (Microscopic Estimation)								
Vegetable fiber[c]	50	55	25	60	0		...	5
Brown colloidal matter[d]	15	15	20	0	100	0	...	5
Hoof and horn	5	10	25	30	0	0	...	5
Hair	5	15	10	Trace	0	0	...	80
Fuzz (fluff)[e]	25	5	Trace	0	0	0	...	5
Charred meat	0	0	20	10	0	100	...	0

[a] Any material from heavy fraction not dissolved by 1:1 HCl. Glass and sand predominate in most samples, although a few contain black cinderlike material, believed to be thoroughly scorched meat.

[b] Calculated from data in table as follows:

From meat scrap, good quality

4.2% (pepsin-indigestible residue) × 45.8% (its protein content) = 1.9% (indigestible protein)

52.8% (total protein in sample) − 1.9% = 50.9% (digestible protein)

Then $\frac{50.9\%}{52.8\%} \times 100 = 96\%$ feedstuff protein digested by pepsin

[c] Primarily straw and other fibrous material from paunch or intestinal tract of animal, introduced by improper cleaning of paunch and intestines prior to cooking.

[d] Proteinaceous material, probably indigestible parts of carcass which have lost their cellular or fibrous structure in cooking process.

[e] Very fine individual transparent fibrous material, usually colorless but sometimes slightly amber. It is much finer than hair and does not possess irregular lateral microscopic structure of wool. High in protein (65 to 70%).

0.35 BIOCHEMISTRY - PART I

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 34-35 (1954)

Fish muscle proteins. -- The sarcoplasm, fibrils and connective tissue or stroma (the three main histological components) of fish-skeletal muscle are being studied to provide a basis for a better understanding of the texture and enzymic changes which occur in fish processed in different ways. The mixture of proteins present in an extract representative of the sarcoplasm in cod and several other species has been analyzed by electrophoresis. Myosin and actin, the two main proteins of the fibril, were prepared in an almost pure condition for investigation of their more important properties. The Fibrillar proteins of cod were found to resemble those of mammalian muscle.

Protein denaturation. -- To improve the quality and texture of dehydrated fish, cod fillets dried in air at 90° to 120° F. and vacuum plate-dried cod fillets were compared. The air-dried fish rehydrated very slowly and only to a slight degree. They remained extremely tough. In contrast, vacuum plate-dried fillets rehydrated very rapidly and to a much greater extent. They were much softer in texture. No significant differences in the chemical properties associated with denaturation of the fish proteins were observed between these two products.

Lipids. -- Only about one percent total lipid is present in the flesh of cod and haddock. Most of this is bound in the form of lipo-proteins. It is believed that a knowledge of the lipo-proteins will aid in an understanding of the changes in quality that are produced by various processing operations. Extraction yields a mixture of lipids very heavily contaminated with non-lipids. The lipids represent an extremely complex mixture which includes several types not yet classified. The most abundant single class of lipid is lecithin. Work on the lipids of cod and haddock indicates the existence of a similar lipid pattern.

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 ABSTRACTER: Martin Heerdt

0.35 BIOCHEMISTRY - PART II

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 35-36 (1954)

Extractives of fish muscle. -- The extractives and volatile substances of fish muscle are being studied in an attempt to understand and explain the changes in flavor, odor, and appearance that occur (1) during the spoilage of unprocessed fish and (2) during processing operations, such as dehydration. This knowledge may lead to methods of assaying, controlling, and improving quality.

Nitrogenous extractives from the muscle of fresh gadoid (cod, whiting, haddock, pollock, poor cod, etc.) and elasmobranch (dogfish and skate) species of marine fish have been separated on ion exchange resin columns (Shewan, 1953). Free amino acid constituents were recently included in this separation analysis. Some of the more important free amino acids and their derivatives have been determined quantitatively. Acidic components recently identified by the use of two-dimensional chromatography include taurine, ethanolamine phosphate, and cysteic acid. Estimates of the amounts of some of the free amino acids (and their derivatives) in 100 grams of wet codling muscle are: creatine, 350 milligrams; creatinine, 55 milligrams; taurine, 400 milligrams, glycine, 25 milligrams; alanine, 17 milligrams; glutamic acid, 12 milligrams; valine, 3.1 milligrams; and leucine, 7.2 milligrams.

It appears that changes may occur in the free amino acid content of cod muscle during spoilage in ice. Cod muscle that was held for 21 days in ice decreased in taurine content to about 40 milligrams per 100 grams of muscle. This loss appeared to be due to leaching by the melting ice. Incubation of macerated cod muscle with typical spoilage microflora produced little change in the free amino acid content. Similarly, samples of dehydrated cod showed that relatively little change had occurred in the

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 ABSTRACTER: Martin Heerdt

0.36 BLOOD LACTIC ACID IN SOME FRESHWATER FISHES FOLLOWING EXERCISE

Black, Edgar C. (University of British Columbia, Vancouver, B. C.)
Federation Proceedings 14, No. 1, Part I, 15 (March 1955)

In 1953, 6 species were forcibly exercised for 15 min. in water at 11°C. Samples of blood were taken by cardiac puncture immediately afterwards while the fish continued to respire in water. Unexercised fish served as controls. In 1954 this work was repeated and extended to include the squawfish and 2-year-old Kamloops trout. The average lactic acid values for the unexercised state ranged from 8.0 ± 0.9 to 8.6 ± 1.9% for the 2-year-old Kamloops trout, chub, carp and northern black catfish. The average unexercised values ranged from 15.7 ± 1.1 to 19.3 ± 4.0 mg. % for the yearling Kamloops trout, fine-scaled sucker, largemouth bass and squawfish. Following forced exercise the average lactic acid values increased significantly in all species. However, there were also significant differences between the exercised values for 1953 and 1954 in both the carp and chub. No reason is offered for this difference. In the following, the combined averages (except as noted) for 1953 and 1954 for the exercised state are expressed as mg. % and are given in increasing order of magnitude. The number of fish used is given in parentheses, and ± standard error of the average is also shown: northern black catfish (19), 34.9 ± 2.6; fine-scaled sucker (34), 55.3 ± 2.6; 1953 carp (13), 54.3 ± 4.5; 1954 carp (9), 77.6 ± 4.3; largemouth bass (13), 76.2 ± 4.9; 1954 squawfish (13), 94.2 ± 7.7; 1953 chub (13), 81.6 ± 9.0; 1954 chub (13), 116.0 ± 9.0; 1954 Kamloops trout 2-year-olds (11), 82.2 ± 10.0; Kamloops trout yearlings (35), 99.8 ± 0.9 mg. %. There is some relation between the degree of apparent activity and the blood lactic acid levels following muscular exercise.

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0.5 BACTERIOLOGY

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 33 (1954)

Further progress has been made in the isolation and determination of the characteristics of marine bacteria that are responsible for the spoilage of fish. Only a portion of the bacteria present on marine fish can be isolated on standard media.

Seventy types of marine bacteria that would not grow on ordinary media were isolated from chitin-containing media. These included about 31 pseudomonads, 28 coryneforms, Chromobacteria, Vibrios, and Proteus spp., and possibly a few Flavobacteria. The types of agar-liquefying bacteria isolated so far include gram-negative motile rods; these were mostly Pseudomonas and Flavobacter spp. Over 30 of the strains that failed to grow on ordinary agar grew on sea-water agar. Media containing 3 to 5 percent sodium chloride afforded maximum growth, although all types grew well in 10-percent sodium chloride media.

The reaction of these bacteria to antibiotics, as well as their morphological characteristics and macroscopic colony appearance, has made it possible to separate most of the gram-negative and some of the gram-positive asporogenous rods into groups that are more clearly defined than has been possible heretofore. Pigmented and non-pigmented pseudomonads were differentiated from each other and from Vibrios by the use of penicillin, streptomycin, and a pteridine, a vibriostatic compound. Achromobacter spp. were differentiated from non-pigmented gram-positive and gram-negative Bacterium spp. with the aid of penicillin, streptomycin, and chloramphenicol.

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 ABSTRACTER: Martin Heerdt

0.5 (Cross Reference: 2.01)

Combinations of normal horse-heart nutrient agar and aged sea-water nutrient agar containing only 0.1 percent 'Lemco' have been compared with Ringer's solution and aged sea water as dilution fluids for use in counting and isolating bacteria from fish by the pour-plate method. Tentative conclusions indicate that the counts are normally increased two or three times on sea-water media, therefore the previously recorded ten-fold increases are exceptional. Sea water in place of Ringer's solution as the dilution fluid did not have any significant effect, although occasionally large increases have occurred. The significance of this can be determined only after a full qualitative analysis of the flora isolated from the count plates.

Heretofore, most of the bacteriological work was confined to cod and allied species. The flora of the skate and the lemon sole is now being examined. There appears to be no seasonal variation in the numbers of bacteria on skate, but the types of bacteria present may vary. Some evidence of seasonal variation has been found in the numbers of bacteria in the slime of lemon sole.

0.35 (Cross References: 4.5, 3.6)

Lipids synthesized, for a determination of their characteristics, and for a comparison of the synthetic with the natural compound were 1:2 and 1:3 (diacyl) phosphatidyl cholines, phosphatidyl ethanolamine, and phosphatidic acids. Attempts to synthesize unsaturated lecithins have failed, but the synthesis of a series of lysolecithins is progressing.

Fat oxidation. -- The first product formed during the development of oxidative rancidity in fats is a highly reactive peroxide. This peroxide either decomposes spontaneously or reacts with unattacked fatty compounds to produce highly flavored substances. Earlier work has shown that the oxidation of the fat of cold-stored herrings is probably catalyzed by hematin pigments present in the lateral band of red muscle. The present work has been focused on the autoxidation of fatty derivatives.

The oxidized fraction of partially autoxidized linoleic acid and its ester can be separated easily. This fraction contains at least two peroxides. Attempts are being made to identify them preliminary to their quantitative separation. This step is necessary because catalysis of the oxygen uptake of fatty derivatives of hematin compounds depends in some ways on a reaction between one peroxide, or both, and the hematin derivatives. The formation of rancidity products in frozen herrings may also be affected directly by this reaction, since strong rancid flavors can normally be detected in cold-stored herrings at unusually low levels of peroxide in the fat.

0.35

free amino acid content (on a dry basis) during processing. These processed samples were found to have less creatine, more creatinine; less taurine and more β-alanine.

Histology of fish skin. -- To obtain a clear comparison of the bacterial invasion and spoilage of fish, particularly in the early stages, it is necessary to have a knowledge of the histology of the skin and its structure and of the chemistry of the skin and its secretions. Several types of slime-producing glands have been identified in the epidermal layer of various commercial species of fish.

Phenolic compounds of biological importance. -- The kinetics of selective alkylation and dealkylation reactions of polyphenols continues to be a subject for investigation. One ionic and one non-ionic type of alkylation mechanism have been identified and successfully applied to the methylation of hydroxyflavones and flavonols. These mechanisms have permitted the selective attack of hydroxyl groups in the 7 and 3 positions or the groups that most frequently undergo glucosidation in plant tissue.

A number of flavonols have been prepared and their reactions studied. A route has been found for the synthesis of difficultly accessible derivatives of kaempferol. A survey of infrared absorption spectra of chelated flavones has been initiated with the hope of obtaining information about the fine structure of this group of polyphenols.

6.19 THE NUTRITIVE VALUE OF FISH MEAL AND CONDENSED FISH SOLUBLES. IX. CONDENSED HERRING SOLUBLES, CONDENSED WHALE SOLUBLES AND DRIED HERRING-WHALE SOLUBLES IN CHICK RATIONS

Biely, Jacob; March, B. E.; and Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 27-31 (December 1954)

Various herring and whale solubles preparations were used as supplements to all-vegetable-protein (ground yellow corn and soybean-oil meal) chick starter basal rations containing added vitamins and minerals. The preparations used as supplements, the chicks fed, and the weight gains obtained are shown in tables I, II, IV, V, and VI. In experiment 1, the dams of the 22 mixed chicks that received each ration had been reared on an all-vegetable-protein ration (with no supplementary vitamin B_{12}) and housed on deep litter. The increased growth produced by condensed whale solubles was due to its vitamin B_{12} content. As little as 1.5 percent condensed whale solubles provided sufficient vitamin B_{12} for normal growth.

In experiment 2, different samples of soybean-oil meal were used in each of the 4 basal rations, and the proportions of corn and soybean-oil meal were adjusted to equalize the protein level in each of the rations. Nineteen cockerel chicks from the same stock as those described in experiment 1 were used in each of the lots fed. The addition of 2.5-percent condensed herring solubles or 2.5-percent condensed whale solubles improved the rate of growth in every instance.

In experiment 3, the rations were fed to New Hampshire pullet chicks from dams that had received a balanced ration which contained fish meal. A good response was obtained by feeding 2.5-percent condensed herring solubles. In experiment 4, a soybean-oil-meal basal ration and a soybean-oil-meal plus meat-meal basal ration were fed to New Hampshire cockerels from dams that had received a complete ration. In experiment 5, the mixed solubles contained 25-percent whale solubles.

(over)

 ABSTRACTER: Martin Heerdt

6.130 FISH BY-PRODUCTS

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 32 (1954)

Herring meal and oil made from preserved raw materials continues to be of primary interest in herring reduction operations. Meal made from herring that had been preserved effectively with formaldehyde has not caused any significant toxic effect in animals. Practical feeding trials made to determine the protein quality of meal made from preserved herring also have yielded encouraging results. Herring have been successfully preserved with formaldehyde in both whole and macerated forms.

White-fish meal and related products were recently included under the herring meal and oil manufacturing program. The existing process and the equipment used in making white-fish meal are being studied for possible improvements in both technical efficiency and in the quality of the product. A pilot plant has been constructed for use in carrying on this work.

The protein quality and vitamin content of white-fish meal produced commercially by flame-drying, steam-drying, and vacuum-drying have been determined at the Rowett Research Institute. It appears that most white-fish meal is of high quality and that no significant improvement in quality is likely to result from changes in production methods.

Other problems of the fish-meal industry that have been included in the program of study are (1) the analysis and standardization of products, (2) the recovery of press water (stickwater), and (3) the examination of proposed alternative products, such as fish silage.

 ABSTRACTER: Martin Heerdt

6.15 THE CONVERSION OF HERRING STICKWATER TO SOLUBLES. II. PREVENTION OF BACTERIAL DECOMPOSITION OF HERRING STICKWATER AT HIGH TEMPERATURES

Thomson, W. A. B.; Idler, D. R.; and MacLeod, R. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 10-11 (December 1954)

Various chemicals and antibiotics were tested as additives for their ability to prevent the loss of solids from stickwater. Each of the additives was thoroughly mixed with the stickwater at 140° F. These mixtures were then stored without agitation at 140° F. After 48 hours of storage, the loss of solids in stickwater with an additive was compared with the loss of solids in stickwater that had not received an additive. Sodium nitrite, versene, and sulphanilamide when tested at levels of 10, 100, and 1,000 p.p.m. were effective only at the 1,000 p.p.m. level. Sodium acid pyrophosphate was effective at a level of 2,500 p.p.m. (0.25 percent by weight). Sulphathiazole, which was more effective than the other additives tested, was fully effective at 10 p.p.m. on one occasion and partially effective at 100 p.p.m. on another occasion. Sulphathiazole was the only compound that was effective at a low concentration on an economic and nutritional basis.

Penicillin G (potassium salt), achromycin, hygromycin, and erythromycin were fairly effective at 1 p.p.m. and completely effective at 10 p.p.m. Neomycin, streptomycin, terramycin, polymyxin B sulphate, and AG-5312-diacetate were not effective at 10 p.p.m. Aureomycin exhibited considerable variation in its effectiveness.

Penicillin G was the most effective and most economical of all the antibiotics tested. The minimum concentration of penicillin G that would completely inhibit bacterial action at 140° F. was 2 p.p.m.

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 ABSTRACTER: Martin Heerdt

6.3 CHEMICAL STUDIES ON MARINE ALGAE. IX. HISTIDINE, ARGININE AND LYSINE CONTENTS IN VARIOUS SPECIES OF MARINE ALGAE

Takagi, Mitsuzo
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 2, 167-172 (August 1954)

Histidine, arginine, and lysine contents in various species of marine algae were determined by Richard J. Block's method. The results obtained are summarized in figure 1, this card, over.

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SOLUBLES IN CHICK FEED

DECOMPOSITION OF STICKWATER

HERRING MEAL MANUFACTURE

HISTIDINE, ARGININE, AND LYSINE IN ALGAE

6.19

TABLE I—Average weights of White Leghorn chicks at 4 weeks of age in Test 1.

Supplement to basal ration	Weight (grams)		
	Females	Males	Average
None	177	224	200
1.5% Condensed whale solubles	239	279	259
2.5% Condensed whale solubles	230	286	258
2 milligrams vitamin B_{12} per kilo.	236	286	261
4 milligrams vitamin B_{12} per kilo.	237	292	264

TABLE II—Average weights of White Leghorn cockerel chicks at 5 weeks of age in Test 2.

Supplement to basal ration	Weight (grams) when fed soybean oil meal basal ration				Average weight (grams)
	No. 1	No. 2	No. 3	No. 4	
None	360	358	352	350	355
2.5% Condensed herring solubles	399	373	401	382	389
2.5% Condensed whale solubles	370	342	385	369	372

TABLE IV—Average weights (grams) of New Hampshire pullet chicks at 5 weeks of age in Test 3.

Supplement to basal ration	Feeding level of supplement			
	0	2.5%	5.0%	7.5%
None	376	407	396	384
Condensed herring solubles		394	392	370
Herring—whale solubles meal				

TABLE V—Average weights of New Hampshire cockerel chicks at 4½ weeks of age in Test 4.

Type of basal ration	Supplement to basal ration	Average weight (grams)
Soybean oil meal	None	366
	2.5% herring solubles	404
	2.5% dried whale solubles	388
	2.5% dried herring—whale solubles	402
	2.5% herring meal	410
Soybean oil meal plus meat meal	None	354
	2.5% herring solubles	381
	2.5% dried whale solubles	366
	2.5% dried herring—whale solubles	390
	2.5% herring meal	394

TABLE VI—Average weights of New Hampshire cockerel chicks at 4 weeks of age in Test 5.

Supplement to basal ration	Average weight (grams)
None	342
2.5% herring solubles	364
1.25% dried herring—whale solubles	362

6.15 (Cross Reference: 3.12)

At this level, pure commercial penicillin G, which is available at 5 cents per gram, would increase the cost of the final concentrated solubles by only 0.04 cents per pound.

Since 140° F. is only the final temperature in the cooling process, it was necessary to determine if penicillin G would be effective at higher temperatures. Penicillin G was added, therefore, to stickwater at 160°, 180°, and 200° F., and held at these temperatures for 10 hours, then cooled to 140° F. and held at this temperature for 48 hours. The solids loss at the end of the 10-hour and the 48-hour period was determined. Penicillin G was fully effective at the 1 p.p.m. level after 10 hours at 160° F. Penicillin G was only partially effective at the 1 p.p.m. level after 10 hours at 180° F., whereas at the 10 p.p.m. level it was completely effective after 10 hours at 180° F. Penicillin G was ineffective at the 1 p.p.m. level after 10 hours at 200° F., and at the 10 p.p.m. level it was greatly reduced in effectiveness. Previous studies have shown that only a negligible amount of decomposition in stickwater takes place at 180° F. If the stickwater could be cooled from 180° to 160° F. within 10 hours (the lag period preceding the beginning of decomposition), the loss of solids could be prevented by the addition of only 1 to 2 p.p.m. of penicillin at 160° F.

Since stickwater is frequently cooled and agitated by bubbling a stream of air through it, it was decided to determine the stability of penicillin G in stickwater that was continuously aerated. After 10 hours at 180° F. followed by 48 hours at 140° F., penicillin G in stickwater at the 10 p.p.m. level was not as effective when the stickwater was aerated as when it was not aerated. After 10 hours at 160° F., penicillin G in stickwater at the 1 p.p.m. level was not as effective when the stickwater was aerated as when it was not aerated. In the absence of penicillin G, the loss of solids in stickwater during 10 hours at 180° F. was twice as great when the stickwater was aerated as when it was not aerated. The lesser effectiveness of penicillin G in the aerated stickwater may have been due to the increased bacterial activity induced by aeration. It appears, therefore, that cooling and mixing should be accomplished without aeration.

6.3

Fig. 1. Graph showing the proportion of histidine, arginine, and lysine contents to crude protein in various species of marine algae

6.130 (Cross Reference: 3.12)

8.51 THE FUNCTION OF HYDROXYPROLINE IN COLLAGENS

Gustavson, K. H. (Swedish Training Research Institute, Stockholm)
Nature 175, No. 4445, 70-74 (January 8, 1955)

The early literature on the comparative properties of collagens from fish skin and from bovine skin is reviewed.

Fish-skin collagen shrinks at lower temperatures and gelatinizes more easily and is more readily degraded and solubilized by acids, alkalis, and trypsin than is collagen from skins of mammalian origin. Other reagents react in a similar way. For example, 5 percent sodium dodecyl sulfate or naphthalene-β-sulfonic acid or polymetaphosphoric acids solubilize cod-skin collagen much more readily than they do bovine-skin collagen. These differences are believed to be due to the molecular organization of the collagens, the fish-skin collagen having a less developed intermolecular cross linking of protein chains, with more weakly developed hydrogen bonding in such links.

Recent work on the amino acid composition of collagens has shown that the principal difference in this respect between fish-skin and bovine-skin collagens is the unusually low (9 percent) content of hydroxyproline in the former as compared to the higher (14 percent) content in the collagen of bovine origin.

In the present work, proline and hydroxyproline were determined in collagens from the skins of two species of fish and from calf skin. The results are listed in table 2, over.

(over)

 ABSTRACTER: M. E. Stansby

8.40 THE SALINITY OF SEA WATER

McCracken, L. H. (Pacific Biological Station)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 102, 24-26 (March 1955)

The oceans contain 3.0 to 3.5 percent of sea salt. The concentration is generally expressed in terms of salinity (parts per thousand, S 0/00). However, owing to the complexity of sea salt, the actual determination of the total amount of dissolved substances by direct chemical analysis is one of extreme analytical difficulty. Even the simple act of evaporating the sea water to dryness produces many chemical changes.

About 1900, an international commission established a procedure whereby consistent results were obtained. On the basis of this work, the arbitrary term "salinity" was adopted. This is the total amount of sea salt expressed as grams per kilogram of sea water after the carbonate has been converted to oxide, the bromine and iodine has been replaced by chlorine, and the residue remaining after evaporation has been ignited to a temperature of 480° C. to constant weight.

One of the singular properties of sea water is that regardless of the absolute concentration, the ratio of the major dissolved salts is virtually constant. The accompanying table shows the percentage of the various ions in the salt found in any sea water.

From these data, it can be seen that if any one of the constituents is known, the amount of any one of the other constituents and of the total amount of sea salt can be calculated. Sea-water samples having the same salt content, regardless of where taken, are essentially identical in physical properties.

(over)

 ABSTRACTER: F. Bruce Sanford

8.59 ARGINASE IN ELASMOBRANCH MUSCLE

Connell, J. J. (Torry Research Station)
Nature 175, No. 4456, 562 (March 26, 1955)

Hunter and Dauphinee demonstrated the presence of arginase in the voluntary muscle of the dogfish (Squalus sucklii) and also possibly in the muscle of the herring. In the course of another investigation, it has now been observed that this is not true of other elasmobranchs, since no arginase activity was found in the skeletal muscle of the common skate (Raja batis), thornback skate (R. clavata) or cuckoo ray (R. circularis) using the conditions of determination of Van Slyke and Archibald with the colorimetric procedure of Engel and Engel. Activity was, however, observed in both the ordinary 'white' skeletal muscle (0.3 arginase units/mgm. extract nitrogen) and 'red' lateral-band muscle (0.75 arginase units/mgm. extract nitrogen) of the lesser-spotted dogfish (Scyliorhinus caniculus) (cf. the observations of Matsuura et al. on several non-elasmobranch species of fish).

It seems that for the rays, at least, the extrahepatic regulation of urea which appears to occur in elasmobranchs cannot take place in the muscle, even though this tissue is rich in urea.

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8.7 SHRIMP INDUSTRY STANDARDS OF QUALITY

Strasburger, Lawrence W. (Speaking at the Session of the Gulf and Caribbean Fisheries Institute, Havana)
Southern Fisherman 15, No. 1, 22, 47 (January 1955)

National Shrimp Canners Association. -- Grade standards, adopted at a meeting held by the National Shrimp Canners Association in January 1954 set the sizes for shrimp under the following designations: Colossal -- less than 2.5 per ounce; Jumbo -- less than 3.5 per ounce; Large -- 3.5 to 5 per ounce; Medium -- more than 5 but not more than 9 per ounce; Small -- more than 9 but not more than 17 per ounce; Tiny -- more than 17 per ounce. These grade sizes were to be based on the cut-out weight per ounce after processing. A weight tolerance of 8 percent was adopted for the differential in loss between regular pack and the cleaned or deveined pack. Usage of such terms as "Broken" or "Whole and Broken" were defined. A tolerance of not more than 5 percent for broken shrimp in a pack of whole shrimp was established.

Tampa Shrimp Producers Association and the United Shrimp Producers Association. -- These organizations have a quality-control program in which 4 quality grades are established: Pearls, Good, Fair, and Pick-outs. Standards are based mainly on melanosis or blackening. Latitude is given the inspectors, and their judgment, when questioned, is either verified or nullified by a Quality Control Board.

The associations have expended much effort on education as to proper methods of catching, handling, and sanitation. Boat crews are paid on the basis of the shrimp quality.

(over)

 ABSTRACTER: F. Bruce Sanford

HYDROXYPROLINE IN FISH-SKIN COLLAGENS

ARGINASE IN ELASMOBRANCH MUSCLE

SALINITY OF SEA WATER

SHRIMP INDUSTRY STANDARDS OF QUALITY

8.7 (Cross Reference: 1.85)

Shrimp Association of the Americas.-- Their standards, for practical purposes, have been set into three categories: (A) Boats and Boat Operations, (B) General Plant Facilities and Equipment; and (C) Plant Operations.

Boats and Boat Operations: Specific sanitation and handling methods are outlined. Maximum trawling and exposure times are set up. Proper methods of washing and icing the shrimp are specified.

General Plant Facilities and Equipment: A description of proper plant facilities is shown. Buildings must be well lighted and ventilated, screened, and proofed against insects and rodents. Building designs shall be such that all equipment, which must be of metal or other nonporous material, may be placed in such manner that it is readily accessible for cleaning. Floors are to be tight and must properly drain into a closed drainage system. Water supplies must be unpolluted. Sanitary facilities must be provided. Wash basins supplied with soap and a hand sanitizing agent shall be so placed as to be easily observable by the supervisor. Washing devices on inspection belts and conveyors for shrimp shall be installed. Metal containers, flumes, chutes, or conveyors are to be provided for removal of debris as trash. Provision for proper maintenance of glaze- water temperatures must be made unless shrimp are overwrapped. Recording thermometers are recommended for freezer and storage rooms.

Plant Operations: All the equipment in the plant and that used in transporting the shrimp shall be washed and sanitized after each use. Shrimp shall be properly iced at all times. On delivery to the plant, the shrimp must be washed, inspected, and culled. Decomposed shrimp, which are strictly defined, shall be discarded. Shrimp shall be expeditiously handled on clean surfaces. Grade size classifications are set up with necessary tolerances. A standard method is given for obtaining the thawed drainage weight of the packaged shrimp, with such weight to meet the declared weight on the package. Provision is made for proper packaging, glazing, and overwrapping. Maximum freezing times are stipulated. Sanitary personal habits are to be observed by all employees.

8.51 (Cross References: 6.86, 0.32)

A detailed discussion on the role of hydroxyproline in stabilizing the collagen molecule is given. The conclusion is reached that stabilization is effected by a hydroxyl group furnished from hydroxyproline.

Table 2. Proline and Hydroxyproline Contents of Collagens

No.	Type of skin	Proline		Hydroxyproline		Proline + hydroxyproline	
		Per cent on protein	Per cent of total nitrogen	Per cent on protein	Per cent of total nitrogen	Per cent on protein	Per cent of total nitrogen
1	Cod fish	10·8	7·2	5·8	3·4	16·6	10·6
2	Pike	13·3	8·8	7·9	4·6	21·2	13·4
3	Bovine (calf)	14·1	9·5	12·7	7·4	26·8	16·9

8.40 (Cross Reference: 7.461)

Usually, the chloride ions are determined by titration with silver nitrate solution. The total salt content (salinity) is then calculated from the formula:

$$\text{Salinity} = 0.030 + (1.805)(\text{chloride ion content}).$$

Proportion of Ions Contained in Sea Salt.

Ion	Per cent	
Chloride	55.04	Negative Ions
Bromide	0.19	
Sulphate	7.68	
Bicarbonate	0.41	
Boric Acid	0.07	(Undissociated)
Magnesium	3.69	Positive Ions
Calcium	1.16	
Strontium	0.04	
Potassium	1.10	
Sodium	30.61	

0.6 QUALITY CONTROL MAN OF TOMORROW

Gould, Wilbur A. (Ohio State University)
Food Packer 36, No. 5, 38-39, 42 (May 1955)

With the growing demand for food products of uniform quality, the processor has come to rely on quality control technologists. Food technologists receive their B. S. degree after receiving training in the following:

1. Production of uniform products of desired quality,
2. Development of new products,
3. Lowering of manufacturing costs and reduction of wastes, and
4. Interpretation of technical data and government regulations.

The food technology student also receives training in such broadening courses as English, public speaking, and journalism, as well as the science courses of bacteriology, physics, biochemistry, and engineering. Usually he specializes in a commodity area, such as poultry or fish. The student receives practical experience in laboratory work; often undergraduates serve on research teams or are assigned minor research problems of their own. The food technology graduate has much to offer the food industry; his goal is to apply science and engineering to the production, processing, packaging, distribution and utilization of foods. In order to fill the positions in food technology, more students should be encouraged to enter the field.

(over)

 ABSTRACTER: Lois Elgin

3.238 HOW EXPERTS VIEW PACKAGING

Anonymous
National Provisioner 132, No. 20, 11-12, 14-15, 34 (May 14, 1955)

Because of varying requirements, it is unlikely that an all-purpose packaging material will be developed for the food industry.

Paper. Paper is a traditional packaging material. Because of their versatility and reasonable cost, kraft, sulphite, greaseproof, glassine and parchment papers are used extensively. Although bleached kraft paper has a high water-vapor transmission rate, when coated with 10 pounds of wax per ream, the transmission of water-vapor drops to a rate comparable with many relatively moisture-proof films.

Wet strength is an important requirement for frozen-food packaging. The high densities of parchment, greaseproof, and glassine papers resist fat penetration which is an important consideration in the packaging of smoked products.

Folding waxed cartons are used extensively in frozen-food packaging. The advantages of these cartons include (1) reasonable cost, (2) uniform size, (3) ability to take printing, and (4) ease of handling by machine.

Cellophane-Pliofilm laminates. In 1947, cellophane-Pliofilm laminates were introducted for vacuum packaging cured meats. Similar developments, such as polyethylene laminated to cellophane, have also been introducted.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.15 PEN SURFACES AND ODOUR DEVELOPMENT IN TRAWLER FISH HOLDS

MacCallum, W. A. (Atlantic Fisheries Experimental Station, Nova Scotia)
Food Technology 9, No. 5, 251-253 (May 1955)

This investigation was conducted to learn the effect of fish-pen surface contamination on the quality of fish preserved in ice and to determine which kinds of hold linings are impermeable to bacteria. The author particularly wants to learn if metal surfaces are necessary when ground fish are stowed aboard Atlantic coast trawlers.

Types and conditions of surfaces tested. The materials and surfaces studied were (1) contaminated spruce boards that had been previously used in trawler holds, (2) boards from the above lot steam sterilized prior to use, (3) freshly planed and unpainted spruce boards, (4) freshly planed and painted spruce boards, (5) unpainted recently set Portland cement, (6) transparent plastic, (7) aluminum alloy sheets, (8) vertically corrugated aluminum alloy pen boards, and (9) horizontally corrulated aluminum alloy pen boards. All of the above surfaces were brushed and washed with clean hot tap water prior to the vessel's departure for the fishing grounds.

The surfaces to be tested were placed on the bottoms and against the pen bulkheads or wings of two fish pens in a trawler fishing out of Halifax. The surfaces, each with an area of about 7 square feet, were compared with the wood surfaces of the fish hold itself. The fish hold consisted of the pen back walls which form the side wall of the vessel and the pen boards or division boards, which measure about 200 square feet in area, in each pen. On five fishing trips, no ice was used between the cod or haddock stowed in the hold and the surfaces under test. Crushed ice in the ratio by weight of one part of ice to two parts of fish was used to surround those fish not in contact with the surfaces under investigation. Ice in the same ratio was used when storing other fish in pens aboard the vessel.

(over)

 ABSTRACTER: Martin Heerdt

2.1123 TESTS OF STEEL TUNA LONGLINES

Anonymous
Pan American Fisherman 9, No. 10, 17 (May 1955)

If American fishermen are to be in a position to exploit the resources of deep-swimming tuna on an economic basis, the amount of manpower required for the long-line method of fishing must be reduced.

With this end in mind, tests were conducted recently by the Fish and Wildlife Service on a new type of flag-line gear. The newly developed fishing gear features a steel main line which is set and hauled with reels that are powered by a small winch. At intervals along the main cable, D-shaped rings are fitted for the attachment of hook-bearing branch lines. The branch lines (nylon) are snapped onto the D-shaped rings automatically, by the use of a mechanical device, as the gear is payed out.

In order to gain a comparison of the new gear with the usual cotton long lines, equal amounts of both were set at 11 locations around Washington and Christmas Islands and in the open ocean.

The steel lines were handled with less effort than the regular cotton long lines and the automatic setting device showed promise.

 ABSTRACTER: Kathryn L. Osterhaug

TECHNOLOGISTS AND QUALITY CONTROL

FISH PEN SURFACE CONTAMINATION

REVIEW OF PACKAGING MATERIALS

STEEL LONG LINES FOR TUNA

2.15 (Cross Reference: 2.19)

Storage of fish in the laboratory. Experiments were also conducted in the laboratory. Three contaminated pen boards were taken from a fish hold. Two of these boards were brushed and washed in warm tap water. One of the washed boards was then sterilized by exposure for 1 hour to steam at 15 pounds per square inch. The third board was allowed to retain its original contamination. Nine odor-free, gutted, unfilleted fish that had been three days on ice were brushed on the outside under running tap water. These fish were then rinsed in the visceral cavity and on the outside under running tap water to reduce the bacteria load to a uniform minimum. Three of these washed fish were laid out on each board, and the boards were placed on a 12-inch-thick bed of ice within a painted spruce box. The fish were then covered with crushed ice to a depth of 12 inches, and the box was stored at room temperature.

Results. Fish stowed against heavily contaminated wood surfaces became bilgy and had a markedly short keeping time as compared with fish stowed against all other surfaces. Almost all of the fish in contact with painted, varnished, or aluminum surfaces, which were the best of the other surfaces tested, were free from bilgy odors. Fish in contact with unpainted wood, that had been previously steam sterilized, did not develop bilgy odors during storage. Washing down the pens between trips was of no benefit if applied to worn wood boards, whereas washing was effective in almost all cases if applied to aluminum alloy and painted wood surfaces. Bilginess appeared to be equally strong regardless of the location in the pen and the vertical or horizontal pattern of the pen if the fish were stowed against worn wood boards. Fish that were stowed against the washed wood board and the contaminated wood board in the laboratory were bilgy in odor after two days in ice. Bilgy odors were not present in fish laid against the sterilized board even after a period of 7 days in ice, after which the test was terminated. Metal screens that hold the fish away from contaminated wood surfaces and at the same time retain crushed ice between the screens and these surfaces prevented bilginess.

2.1123 (Cross Reference: 1.1)

0.6 (Cross Reference: 9.7)

HERE A TASTE PANEL, by using the triangle method, is subjectively evaluating a food product for flavor difference and preference. Two duplicate samples and one odd sample are presented to each technologist. He is asked to select the duplicates and then give his preference for one or more samples. Resulting data are easily evaluated for significant flavor differences. In practice, this method is usually combined with a scoring method, or it can be used with large consumer panels. It is an excellent quality control tool.

CHEMICAL METHODS for determining quality: The technologist is measuring AIS content of sweet corn, one of several quick chemical methods (fiber, pH, total acid, SO_2, pericarp, vitamin content, sugars, etc.) The student must become familiar with these tests as they apply to specific commodities.

3.238

Plastic films. Plastic films, including Pliofilm, Saran (vinylindene chloride copolymer film), and polyethylene film, are transparent and thermoplastic. They give strong weld-type seals. A unique characteristic of Pliofilm is its ability to stretch as much as 400 percent and to resist puncture by bones or other sharp edges. Saran is being used in increasing volume for packaging cured meats and sausages. It is the most moisture-proof and gas-proof of the monofilament transparent materials now in use. Polyethylene is characterized by its chemical inertness, low temperature flexibility, low permeability to water vapor and relatively high permeability to oxygen.

Aluminum foils. Resin-coated foils and foil laminates are becoming important packaging materials. Aluminum-foil heat sealing laminates have the following desirable characteristics: (1) a bright, shining surface which prints well and gives seal appeal to the package, (2) very low permeability to moisture and oxygen, (3) pliability over a wide temperature range, (4) dimensional stability, (5) heat conductivity and heat reflectivity, and (6) good packaging machine performance. Trays and containers made from unsupported foil, 3 to 6 mils in thickness, are being used increasingly for packaging frozen pies and other specialities. The products can be cooked or heated in the package.

Conclusion. Films with high oxygen permeability and low-moisture permeability are recommended for packaging fresh meats. Films which are resistant to the transmission of both oxygen and water vapor are best for protecting frozen meats and related products.

1.1 VITAMIN CONTENT OF FISHERY BYPRODUCTS. PART 2. VITAMIN B_{12} IN PACIFIC SARDINE (SARDINOPS CAERULEA) ORGANS AND RIBOFLAVIN, NICOTINIC ACID AND VITAMIN B_{12} IN ALBACORE TUNA (GERMO ALALUNGA) ORGANS

Karrick, Neva L.
Commercial Fisheries Review 17, No. 2, 8-11 (February 1955)

(Abstract of this article appears under 8.64 page 7)

1.1 TESTS OF STEEL TUNA LONGLINES

Anonymous
Pan American Fisherman 9, No. 10, 17 (May 1955)

(Abstract of this article appears under 2.1123 page 19)

1.1 A TUNA FISHERY AWAITS NEW ENGLAND FISHERMEN

Anonymous
Fishing Gazette 72, No. 4, 40 (April 1955)

1.2 VITAMIN CONTENT OF FISHERY BYPRODUCTS. PART 2. VITAMIN B_{12} IN PACIFIC SARDINE (SARDINOPS CAERULEA) ORGANS AND RIBOFLAVIN, NICOTINIC ACID AND VITAMIN B_{12} IN ALBACORE TUNA (GERMO ALALUNGA) ORGANS

Karrick, Neva L.
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1.2 SMOKE CURING

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 29-31 (1954)

(Abstract of this article appears under 3.4 page 7 - June 1955 issue)

1.2 PREPARING AND PACKING MENHADEN FOR MARKETING

Harrison, George R.
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Chemical Abstracts 43, No. 9, 3540 (1949)

1.85 NEW TECHNIQUE OF FREEZING SHRIMP AT SEA

Mingledorff, W. L.
Fishing Gazette 71, No. 11, 52 and No. 12, 50 (November and December 1954)

(Abstract of this article appears under 3.234 page 15 - February 1955 issue)

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Kahn, Richard A.
Southern Fisherman 15, No. 2, 28-29, 54-55 (February 1955)

(Abstract of this article appears under 2.6 page 5 - June 1955 issue)

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Springer, Stewart and Bullis, Harvey R.
Commercial Fisheries Review 16, No. 10, 1 (October 1954)

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Kendrew, J. C.; Parrish, R. G., Marrack, J. R.; and Orlans, E. S.
Nature 174, No. 4438, 946-949 (November 20, 1954)

(Abstract of this article appears under 8.51 page 17 - May 1955 issue)

1.95 AUSTRALIAN WHALING RESULTS

Anonymous
Fisheries Newsletter 14, No. 1, 5 (January 1955)

A summary is given of whaling results from 1949 to 1954. Oil yield per whale ranged from 30.0 to 51.2 barrels.

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Contributions to Canadian Biology (Supplement to the 7th Annual Report of the Department of the Naval Service, Fisheries Branch) 1-51 (1918)

3.12 THE CONVERSION OF HERRING STICKWATER TO SOLUBLES. II. PREVENTION OF BACTERIAL DECOMPOSITION OF HERRING STICKWATER AT HIGH TEMPERATURES

Thomson, W. A. B.; Idler, D. R.; and MacLeod, R. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 10-11 (December 1954)

(Abstract of this article appears under 6.15 page 15)

3.12 FISH BY-PRODUCTS

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Report of the Food Investigation Board (Great Britain) for the Year 1953, 32 (1954)

(Abstract of this article appears under 6.130 page 15)

3.12 "LIQUID SMOKE" AS A PRESERVATIVE FOR FISH FILLETS

Erdmann, A. M.
Fischw. - u. Feinkostind 26, 110 (1954)
Food Science Abstracts 27, No. 1, 23 (January 1955)

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3.231 FREEZING AT SEA

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(Abstract of this article appears under 2.118 page 5 - June 1955 issue)

3.231 IN PLACE TEST STUDIES OF INSULATED STRUCTURES

Simons, Edward
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3.231 FAST FREEZING TUNNEL PROCESSING

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3.234 REFRIGERATION OF TUNA AND SARDINES BY SODIUM CHLORIDE BRINES

Farber, Lionel
Food Technology 9, No. 3, 141-147 (March 1955)

(Abstract of this article appears under 2.15 page 19 - May 1955 issue)

3.234 QUESTIONS OF PRESENT INTEREST REGARDING FREEZING TECHNIQUE

Anonymous
Report on Technological Research Concerning Norwegian Fish Industry II, No. 15 (1954) 149 pp.

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3.39 SODIUM CONTENT OF FOOD

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(Abstract of this article appears under 8.42 page 7)

3.39 THE SODIUM AND POTASSIUM CONTENT OF BRITISH COLUMBIA SEA FOODS. I. SALMON AND TUNA (IN WATER) CANNED WITHOUT ADDED SALT

Murray, J. F.; Brumwell, C. A.; and MacLeod, R. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 17-19 (December 1954)

(Abstract of this article appears under 8.42 page 17 - May 1955 issue)

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6.138 SEPARATION OF SAPONIFIED AND UNSAPONIFIABLE PORTIONS OF FATS AND OILS

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6.138 A PARTIAL IODINATION OF SQUALENE OR SHARK LIVER OIL

Sakurauchi, Tadashi
Japan. patent 6023 (November 21, 1953)and 6024 (1953)
Chemical Abstracts 48, No. 19, 11736 (1954)

6.237 DEODORIZATION OF SHARK-LIVER OIL

Mathew, P. K.; Nair, P. V.; Ramakrishnan, T. A.; and Sreemulanathan, H.
Nature 162, 494 (1948)
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Higashi, Hideo; Shimma, Yaichiro; and Kinumaki, Toyosuke
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 4, 328-43 (1954) (English summary, figure and table)

I. Molecular distillation of modified oil
II. Concentration of vitamin A by saponification
1. Reexamination of Takahashi's method

6.237 ON THE REMOVING OF F.F.A. OF LIVER OIL

Kitamikado, Manabu and Tanaka, Haruo
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 12, 1223 (1954) (English summary and tables)

6.3 DEGRADATIVE STUDIES ON FUCOIDIN

O'Neill, A. N.
Journal of the American Chemical Society 76, No. 20, 5074-76 (October 20, 1954)

Fucoidin, prepared from Fucus vesiculosus, was subjected to mild acetolysis and the material recovered from the acetolysate was converted to a mixture of acetylated alditols. Chromatographic resolution of this mixture on Magnesol has led to the isolation in crystalline form of L-fucitol pentaacetate and the acetylated derivative of a reduced disaccharide. This disaccharide derivative has been converted to the crystalline free sugar alcohol. This alcohol has been defined by analysis and periodate oxidation as 2-α-L-fucopyranosyl-L-fucitol, thereby providing further evidence for the presence of 1,2-glycosidic linkages in fucoidin.

6.3 USE OF SEAWEED MEALS IN CONCENTRATE MIXTURES FOR DAIRY COWS

Burt, A. W. A.; Bartlett, S.; and Rowland, S. J.
J. Dairy Research 21, 299-304 (1954)
Chemical Abstracts 49, No. 3, 1988 (1955)

In view of the relatively high cost, low palatability, and low nutritive value of seaweed meals, their possible use in the feeding of dairy cows appears very limited.

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Chemical Abstracts 45, No. 22, 10511 (1951)

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Toyama, Yuzo; Tetsumoto, Sogo; Tukuya, Saburo; and Yamada, Shuzo
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Hydraulic clam dredge	1	2.1128
Electronic guiding of fish	3	2.1129
Steel long lines for tuna	19	2.1123
Handling fresh fish		
Fish pen surface contamination	19	2.15
Marine plant products		
Histidine, arginine, and lysine in algae	15	6.3
Seaweed meals in cow feeds	25	6.3
Degradative studies on fucoidin	25	6.3
Marketing		
Transportation of frozen fish	5	3.26
Standards for fishery products	7	8.7
Menhaden		
Preparing menhaden for market	21	1.2
Nutrition and medicine, general		
Pelleted fish food developed	9	9.14
Nutritional value of fish and toxicity		
Nutritive value of seafood	3	2.9
Nutritional value of fishery byproducts other than meal		
B vitamin content of fish organs	7	8.64
Preservatives and sanitation		
Liquid smoke preservative	23	3.12
Rancidity		
Stability test for oils and fats	29	8.7
Regulation and inspection		
Labeling dietetic foods	9	9.3
Shrimp		
Shrimp fishing in the Gulf of Mexico	21	1.85
Spoilage		
Keeping fresh crabmeat	1	2.01
Aureomycin vs. live-fish bacteria	3	2.01
Bacteria in marine fish	13	0.5
Tuna		
New England tuna fishery	21	1.1
Vessels, fishing		
Stabilizer to reduce rolling	1	2.115
Whales and other marine mammals		
British Columbia sea lions	21	1.95
Australian whaling results	21	1.95

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(Abstract of this article appears under 8.40 page 17)

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Grau, R.
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Bro-Rasmussen, F. ; Hjarde, W. ; and Porotnikoff, Olga
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A method was described for preparing dicalcium phosphate for chromatography of fish liver oil unsaponifiable matter. The adsorbent permits a separation of all-trans vitamin A, neovitamin A and vitamin A_2.

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(Abstract of this article appears under 3.230 page 11 - April 1955 issue)

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(Abstract of this article appears under 3.230 page 11 - April 1955 issue)

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